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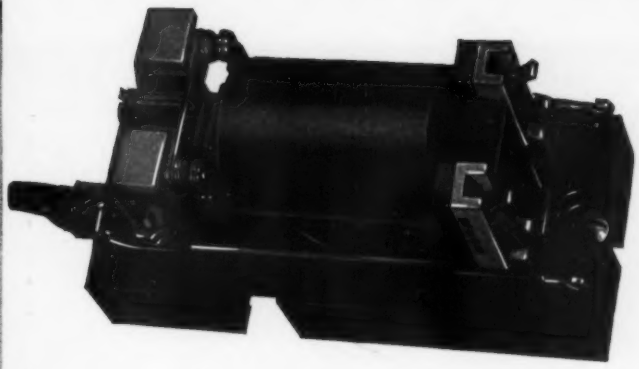

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The Journal of the Telephone Industry

FEBRUARY 9, 1946

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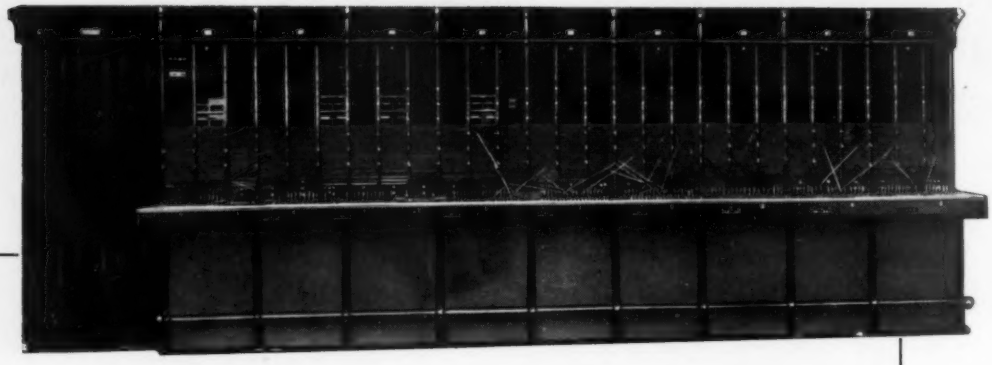

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LINE EQUALIZATION PROCEDURES

For Radio Program Service

By GEORGE B. MEYER

BECAUSE of a general increase in radio broadcasting and the networks' effort to obtain a variety of programs, shows and special events of general interest are put on the air from all sections of the country. Telephone companies everywhere should be in a position to provide circuits for this service if and when called upon to do so. Telephone companies' operating personnel are not in all cases familiar with the requirements of program lines. It is believed that the following information will prove of value in the provision of this special service.

In the design and construction of lines for program service, the unequal attenuation of audio frequencies by ordinary telephone circuits is often the chief contributor to frequency distortion. It is the purpose of this article to discuss measurement techniques and equalization procedures to entirely eliminate or at least minimize any frequency distortion from this source. It is realized that a number of equalization arrangements have been developed and used extensively in actual practice. This discussion will, however, be confined to only two methods. These two methods have been selected because they both are relatively simple in application and operation, are used extensively and have been proved in commercial practice.

Because of the nature of program systems, it has been assumed that the frequency band width to be transmitted will be 35 to 8,000 cycles and that the line circuits involved will be confined to urban areas.

The operation of equalizing a non-loaded line consists of modifying its electrical characteristics in such a manner that all frequencies within the band to be transmitted are attenuated by an equal amount. As the attenuation of a non-loaded line is greater at higher frequencies than at low frequencies, it is necessary to introduce a correcting loss; that is, a loss that is greater at low frequencies than at high frequencies and is complementary to the line loss. This results in a higher over-all loss but one which is constant over the band of frequencies to be transmitted and proportional to the length of the line. If the introduced equalizer attenuation does not reduce the received level to within 30 db of the lines crosstalk and noise level, the additional loss caused by the equalization can easily be compensated for by an increase in amplifier gain.

A four-mile, non-loaded No. 19 gauge cable circuit which is terminated at the distant end with a 500-ohm resistance has an impedance at the sending end of about 1,200 ohms at 100 cycles and about 150 ohms at 5,000 cycles. If such a circuit is terminated at both the sending and terminating ends in an impedance of about 150 ohms the reflection loss at high frequencies is reduced while the same mismatch causes a greater reflection loss at low frequencies. Such a termination results from connecting the line side windings of a 111-C or 119-C repeating coil in parallel as shown in *Fig. 1*. The impedance presented to the line by so connecting the coils will be 165 ohms for 111-C and 155 ohms for 119-C coils. This change in reflection loss provides

LENGTH OF NON-LOADED CIRCUITS THAT CAN BE EQUALIZED TO WITHIN ONE DB FROM 35 TO 8,000 CYCLES

Gauge	Repeating Coils Only	Repeating Coils and Equalizer
16	5.0 Miles	21.5 Miles
19	2.3 Miles	10.0 Miles
22	1.5 Miles	6.5 Miles
24	1.1 Miles	5.0 Miles
26	0.9 Miles	4.2 Miles

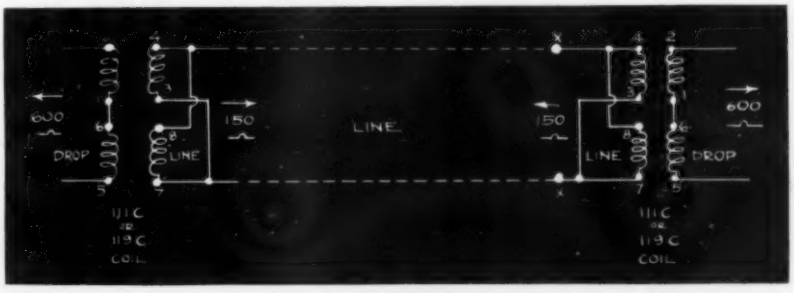


Fig. 1

enough frequency correction for short length non-loaded circuits. It should be stressed, however, that this arrangement has definite limits but is entirely satisfactory over circuits of reasonable length as shown in *Table 1*. The input or output impedance of the circuit may be reduced to 150 ohms to match 150/250-ohm terminal equipment without loss of equalization by connecting the coils as shown by *Fig. 2*.

If the circuit being modified is too long to be equalized by the use of repeating coils only, an equalizer, as

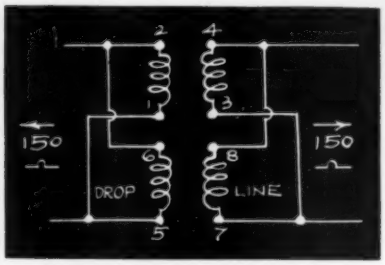


Fig. 2

shown in *Fig. 3*, should be connected to points X and X in *Fig. 1*. The equalizer consists of an LC circuit resonant at about 9,500 cycles and a series of resistors which are semi-adjustable. The action of the equalizer in making the transmission loss constant over a range of frequencies is as follows: At low frequencies the reactance of the inductance appears to the line as a low resistance shunted across the circuit. The amount of loss at low frequencies is varied by the amount of resistance connected in series with the inductance. As the frequency is raised the reactance of the inductance increases and the loss becomes less. As the frequency approaches the resonant frequency of the tuned circuit the parallel impedance becomes so high that only a very small loss is introduced. Thus the equalizer has a complementary loss to the line and causes, in combination with the line, a constant loss between 35 and 8,000 cycles. In all cases, the repeating coils should remain installed and are treated as a portion of the line in measurement.

Transmission measurements on program circuits are neither complicated nor difficult to accomplish. Standard transmission measuring equipment will no doubt be available in many cases but the lack of equipment designed for this special purpose need not prove a handicap. The equipment needed for transmission measurement consists of (1) a source of variable audio frequencies over the range to be equalized. This frequency generator may be continually variable over the band or may be capable of being varied only

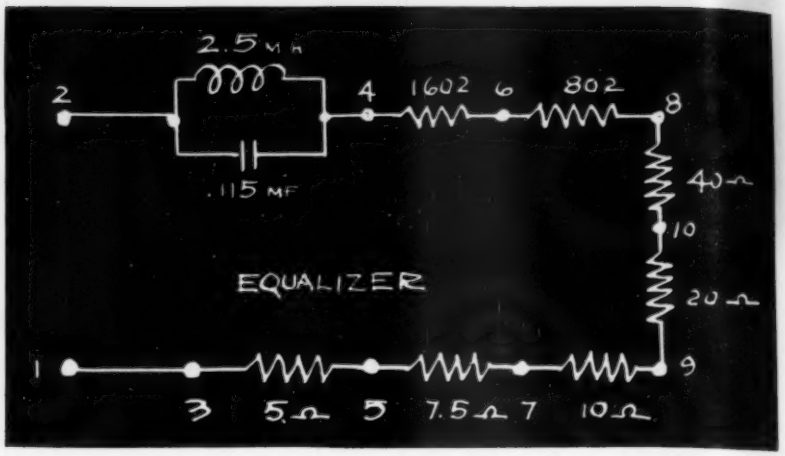


Fig. 3

by given frequencies but should have an output amplitude control; (2) two alternating current voltmeters capable of measuring rather small voltages whose internal impedance is large enough that a negligible voltage drop is caused by bridging across a line (4,000 to 75,000 ohms); (3) a few carbon resistors capable of dissipating one watt or more. The values of these resistors will depend on the line impedance used. Typical values are shown in *Fig. 4*.

The line to be equalized should be connected as shown in *Fig. 1* or with the repeating coils strapped as in *Fig. 2* if working into 150/250-ohm drop terminal impedance. At the sending end of the line connect the oscillator as shown in *Fig. 4*. The AC voltmeter or volume indicator is connected to the 500/600-ohm output terminals of the oscillator and resistors R_1 and R_2 connected from the same terminals to terminals 2 and 5 of the repeating coils.

The inclusion of resistors R_1 and R_2 is important and under *no* conditions

COMING CONVENTIONS

Texas Telephone Association, Adolphus Hotel, Dallas, March 11 and 12.

Kentucky Independent Telephone Association, April 4 and 5. No hotel named as yet.

Nebraska Telephone Association, Paxton Hotel, Omaha, April 9 and 10.

Iowa Independent Telephone Association, Ft. Des Moines Hotel, Des Moines, April 11 and 12.

United States Independent Telephone Association Executives' Conference, Edgewater Beach Hotel, Chicago, April 16 and 17.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 23 and 24.

Indiana Telephone Association, Severin Hotel, Indianapolis, May 1 and 2.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, May 8 and 9.

Wisconsin Independent Telephone Association, Park Hotel, Madison, May 14, 15 and 16.

New York State Telephone Association, Hotel Onondaga, Syracuse, May 22 and 23.

Pennsylvania Independent Telephone Association, Lawrence Hotel, Erie, June 4, 5 and 6.

Oregon Independent Telephone Association and Washington Independent Telephone Association, Hood River, Ore., June 13, 14 and 15. No hotel named as yet.

Michigan Independent Telephone Association, September 18 and 19. Hotel Olds, Lansing.

United States Independent Telephone Association, Stevens Hotel, Chicago, October 14, 15 and 16.

North Carolina Independent Telephone Association, Pine Needles Hotel, Southern Pines, November 11 and 12.

Alabama Independent Telephone Association, Jefferson-Davis Hotel, Montgomery, November 18 and 19.

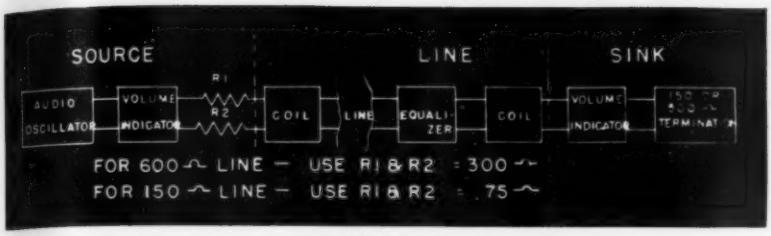


Fig. 4

should they be omitted. It has been noted that the input impedance of a non-loaded line varies with frequency and if the output terminals of the audio frequency generator were connected directly to the repeating coils and the applied voltage measured at this point the reading would not be constant but would be higher at the low frequencies than at the high frequencies.

Obviously, applying equalization to the line for this measured voltage would not be the same as applying equalization for constant voltage applied from the generator as would be the case in actual practice and would result in an improperly equalized line. Therefore, the voltage should be held constant at the generator output and applied to the line through a resistance of the characteristic, input impedance of the line, that is 150 or 600 ohms. It should be noted that the loss of 10 or 12 db in this pad during equalization and the use of only four or six db isolation during operation have no direct relation on the frequency transmission of the line. The use of higher loss during equalization is for accuracy of measurement only and has no effect on the line's operation.

An alternate method of establishing transmission levels is shown in *Fig. 5*. The oscillator output level should be established with the switch thrown to the resistor and then switched to the line input. The oscillator gain control should *not* be readjusted after being set with the resistance.

The far end of the line should be terminated in a resistor equal to its terminal impedance and the voltmeter or volume indicator connected in parallel with this resistor. Again it should be remembered that the impedance of the line changes with frequency and without a resistive termination would give erroneous readings. A repeating coil does *not* give termination resistance but only tranforms impedances.

The oscillator should now be calibrated and a value of output chosen to give a convenient reading on both volume indicators at 1,000 cycles. The difference in readings between the two meters (input and output) is the loss of the line at 1,000 cycles. Next apply an 8,000-cycle voltage to the line using the same input level. The difference between the meters is the line loss at 8,000 cycles.

Connect terminals 1 and 2 of the equalizer to the points marked X in *Fig. 1*. Adjust the oscillator to its original output at 1,000 cycles and vary the resistors associated with the equalizer until the loss of the line at 1,000 cycles equals the loss at 8,000 cycles. Repeat the measurement at

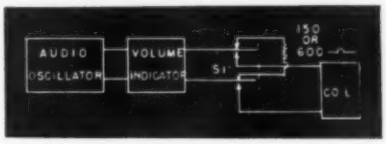


Fig. 5

8,000 cycles and 1,000 cycles until both readings are within one db of the same loss. Now make measurements at 30, 50, 100, 400, 600, 1,000, 2,000, 3,000, 4,000, 5,000, 7,000, and 8,000 cycles. If necessary, other values of frequency can be used. All readings should be within one db of the loss at 1,000 cycles. The line is now ready for program use.

Caution: Do not use over one miliwatt of power in any single frequency measurement work because of interference to other services by crosstalk.

>> *Governmental agencies and officials who still quote statistics concerning the number of farms and farm operators in the U. S. in order to show the lowest possible rural telephone saturation would do well to consider the census on farms in the country now being compiled by the U. S. Bureau of Census for 1945. A preliminary release by the bureau, dated November 12, 1945, indicated that the number of farms is diminishing, although the total acreage under cultivation is increasing. Census Director J. C. Capt said: "The preliminary totals are now 1,142,817,821 acres comprising 6,010,572 farms, compared with 1,060,852,374 acres and 6,096,-799 farms in 1940." The Census Bureau statement stated:*

"The loss of 1.4 per cent of the nation's farms since 1940 occurred despite the fact that numerous agricultural activities such as Victory gardens, which because of lower prices would not have been considered farms in 1940, were counted in 1945."

The 1945 census also included as farm acreage certain Indian grazing lands not so classified in previous census figures. A somewhat earlier preliminary estimate, dated May 7, 1945, released by the Census Bureau in collaboration with the U. S. Department of Agriculture, showed that the number of farm operators in the United States decreased more than 6,000,000 in April, 1940, to approximately 5,500,000 in April, 1944, a reduction of nearly 10 per cent.

>> *The early Dutch settlers on Manhattan Island had an efficient means of communication before the year 1700. It might be called the first wireless system used in America, although there was no electricity and the poles were common Dutch windmills.*

In a few years after the Dutch arrived in America there was a windmill on every bit of rising ground on the island which is now New York City. When the windmills were not running, their owners, using a regular code of signals, used them to signal friends or neighbors.

When the sails were set square, with one arm pointing to the earth and one to the sky it meant a hostile invasion. The same signal with the upper-half of the mill door open heralded a peaceful arrival. Through many combinations involving the sails and the mill door a great variety of messages could be transmitted. By being repeated on each mill, a message could be sent throughout the island in a very short time.

Congress to increase FCC appropriation. . . . Commission Chairman Porter testifies as to need of additional funds to cover greater FCC activities. . . . Emphasizes telephone and recording regulation problems.

CONGRESS has decided to raise the ante for the Federal Communications Commission appropriations. As it passed the House (and is quite likely to pass the Senate) with no change—the new Independent Offices Appropriation Bill gives the FCC $5,585,000 with which to do business for the fiscal year which begins June, 1946, ending January, 1947.

This represents a boost of almost $200,000 over the FCC appropriation for the current fiscal year of 1946 which ends next June. Some idea of how much FCC's living expenses have increased during the war can be obtained by comparing the fiscal 1947 figure, of nearly six million, with the 1939 appropriation of 1.7 million.

Of course, much of this increase is the result of the rapid advancement in radio techniques, plus a backlog of broadcast license applications. FM radio, television, are only two of many new radio electronic developments, some born of the war and others deferred because of it, which FCC must now handle on a normal regulatory basis. Even in the field of so-called "common carriers" (which means the telephone, telegraph, radiogram and other such commercial services), the FCC is faced with a dynamically changing technology and all the big and little regulatory ramifications which follow. FCC chairman, Paul A. Porter, who explained the commission's budget to the House Appropriation Committee said, on this point:

"I think most people consider that the licensing authority for broadcast stations is the greatest part of our work, when, as a matter of fact, the regulation of our common-carrier communication companies constitutes really the major part of our activity. I think it is interesting to note that the industry which this group represents had in 1944 gross assets in excess of 7½ billion dollars and gross revenues of over $2,000,000,000. The industry that we are confronted with includes two nationwide monopolies, the AT&T and the Western Union; in addition, 67 Independent telephone companies, and 13 principal international cable and radio companies.

"There is going to be a tremendous increase not only in the routine regulatory work of the commission ratewise with respect to these services, but they plan a vast modernization program — both AT&T and Western Union—that involves, on the part of the commission and its staff, an analysis of equipment costs, the systems that are used, the effect of that system on service. And I think it would perhaps illustrate the point if I would sketch briefly what the Western Union plans during the next few years.

"Congress, as you know, authorized the consolidation of Western Union and Postal. That creates a monopoly where, heretofore, there was competition. I think we will agree that that places upon the regulatory agency even a greater burden with respect to protecting the public interest from the standpoint of rates and services."

Chairman Porter gave an interesting account of the impact of radio technology on the telegraph business. He stated on this point:

"Western Union is faced with, I would say, a desperate fight for its existence as an efficient going concern. They plan to abandon completely the old system of wire lines and telephone poles, what they call their outside plant, and replace it ultimately with a system of radio relays which, with automatic new devices, not only speeds the service but reduces the cost. It is the firm policy of the board of Western Union that this is the only way in which the domestic telegraph company, perhaps, can survive."

REPRESENTATIVE THOMAS, (D., Texas): "Mr. Porter, do you have the right to inspect the books of the company?"

MR. PORTER: "Let me put it this way. As we point it out in our justification, in 1945 the company submitted a plan for the complete replacement of

its entire plant. This plan calls for cash expenditures at an annual rate, beginning in 1946, of $13,000,000, and contemplates the installation of these services that I have described."

Among other things the FCC has to do in the months ahead, is a complete revision of Western Union rates, so as to make them uniform for various distances, just as telephone long distance rates are uniform. Competition between telephone and telegraph has been sharpened by the advent of recording devices used in connection with telephone conversations. Speaking of recording a long distance telephone call from coast-to-coast, at $2.50 for three minutes, Chairman Porter said:

". . . a plain language telegram for that distance would be 12 cents a word. In other words, if you had this recording device—and this is one of the things the telegraph company is confronted with on the competitive situation—if a business institution in New York would call its correspondent in San Francisco and have a recording made, I assume he could talk 100 words a minute, and for $2.50 get 300 words in, whereas the telegraph would cost, at ordinary rates, $36. That is the type of problem that the commission is very much concerned with and that we have got to meet, and we fixed that to start around the first of the year."

Chairman Porter served notice that the FCC is going to change its approach with respect to fixing long distance telephone rates now that the war is over and the FCC has a little more time on its hands. He observed that Commissioner Walker, who has taken the lead for the FCC in telephone matters, has been very successful in negotiating long distance rate reductions. Chairman Porter said, however, on this point:

"With respect to the domestic telephone service, under existing legislation, as you gentlemen know, Congress has directed this commission to take the place of competition in determining rates and assuring the public reasonable rates for interstate telephone service. Naturally, through the war, this function lagged and preference was given to wartime problems. So, instead of having the usual type of rate-making procedures that you are all familiar with in the field of public utilities, we were required, because of the time steps involved and the preoccupation of the staff with wartime problems, to undertake to protect the public interest in this respect through negotiation. . . .

"I think it is quite clear—and I would be glad if Commissioner Walker would amplify this—but I think it is quite clear that this is an unsatisfactory method of rate regulation, for us to sit down and bargain: 'Well, how much will you cut off here?' There should be a factual determination, and effective regulation requires thorough work in the supervision of original cost accounting studies; the prescription of proper depreciation rates, and maintenance of adequate, continuous, property records. The cost accounting studies we have done have already resulted in reductions of about $10,000,000 in the overstated net book cost."

On the subject of rural telephone service, Chairman Porter said:

"We have the phenomena in which recent commission studies have shown that while the total number of telephones in use was increasing, from 14,000,000 in 1920, to more than 23,000,000 in 1940, the number of telephones on farms simultaneously declined from 2½ million in 1920 to 1½ million in 1940. We are told that there has been some increase since 1940. But it is clear that the future telephone plant expansion of the AT&T should not be such as to encourage more telephones in the city at the expense of fewer and fewer telephones on the farm.

"There is no question but that in the normal activities of a great business enterprise like the AT&T quite naturally they want to hit the pay-dirt market. We have an obligation under the statute to require extension of service into areas where they are not now served."

* * *

Readers of this department will doubtless be gratified to know that after all the bragging this writer did, several weeks ago, about his luck in forecasting events for 1945, he has started the still new year of 1946 off with a thumping big goose-egg. In other words, the United States Supreme Court, in the recent New York Telephone Co. decision, has, in effect, jerked the rug right from under the big feet of Prophet Welch, just as he was taking a bow.

Indeed, the New York Telephone Co. decision, handed down January 28, not only reversed the lower court (to say nothing of reversing Mr. Welch), and upheld the FCC—but went even a good deal further than might have been strictly necessary. The FCC can claim a clean cut victory for its "original cost" theory of accounting, on behalf of itself and the Federal Power Commission and other federal regulatory powers which have been touting these theories for a long while.

The facts in the New York Telephone case are fairly simple:

In the late '20's, the New York Telephone Co. bought certain property from its parent, the AT&T, paying $4,166,000 in excess of original cost. This excess was entered as part of "structural value" in the plant account of the New York company under the rules prescribed by the Interstate Commerce Commission (ICC), which then had jurisdiction. In December, 1943, the FCC specifically ordered the New York company to eliminate the excess item from its plant account on grounds that it was an inflationary "write-up." The company appealed to the lower federal court on the principal contention that the FCC should not retroactively apply its new theories of accounting to entries lawfully made before its own statutory existence. The lower federal court upheld this view.

The surprise in the U. S. Supreme Court's recent decision (5 to 1) was occasioned by the fact that the court qualified a stipulation which the government itself had made (in a previous controlling case) to the effect that amortization of accounting entries, made under such circumstances, could not be ordered by the FCC without determination as to the value of the plant items in question. The court's decision, in the New York Telephone Co.'s case, by Justice Rutledge waived aside this interpretation as being no longer binding on the FCC.

Still another unexpected angle of the Rutledge opinion was its implied approval of the FCC's view that even though a utility's depreciation reserve as a whole may be excessive (as in this case), inadequacy of depreciation reserve requirements for a particular item (as reflected under the FCC's accounting rules) can, nevertheless, be followed through by the commission in the form of an order to eliminate a "write-up," even after the property in question has been retired. The court said: "We cannot say such a conclusion was erroneous." The FCC's rejection of the so-called "group method" theory of depreciation accounting was also reviewed without disapproval by the court.

The Supreme Court, answering the contention that the original accounting entries were legal when made, because in full compliance with ICC regulations, held that it was not necessary to decide this, as the order under review was not based exclusively upon the ground that the original entries were illegal. ". . . The report, read as a whole," said the court, "shows that the commission's order for the readjustment of the accounts went on the view that the inflation was not justifiable in the light of its own original

(Please turn to page 35)

THE PLANT MAN'S NOTEBOOK

BY RAY BLAIN • TECHNICAL EDITOR

THE CABLE breathing question is creating considerable interest and we are receiving numerous letters on the subject from various sections of the country. One cable engineer writes:

"We had a case of trouble due to cable breathing where the cable entered the central office and spliced to silk and cotton insulated cable for termination on the main frame. This cable was 202 pair, 22-gauge. The trouble definitely was traced to the cable breathing moist air and condensing at a cool spot inside the building. We spent approximately $2,000 on this trouble before it definitely was located and corrected by installing a pressure tight sealing plug outside the central office.

"In another exchange, we had a 202-pair feeder cable with a 51-pair distributing cable breaking off of it. The 51-pair cable extended down the pole from the splice in the main cable and into the underground dip about 150 ft., across a street, then up a pole, extending aerially for about two blocks. A total of 10 terminals was connected to this cable.

"During cold weather, the 202-pair cable would breathe through the 51-pair cable at the point of connection. The moisture would condense at the frost line. This cable was carefully pressure tested for opening in the sheath at this particular point and none was found. This cable was opened at the frost line and the moisture dried out. After repairing, a pressure plug was placed on the 51-pair cable just about the "U" guard where it first entered the underground dip. No further trouble has been encountered in three years."

* * *

Numerous amusing incidents occurred during the recent telephone operators' strike in Washington, D. C. It was a little disconcerting when the writer attempted to call Washington, D. C., from Falls Church, Va., where a manual switchboard is maintained, to hear a man answer, "Number, please?" Incidentally, a number of male employes were utilized as operators in the latter locality. When asked if he could complete a call to a "North" number, one of them replied, "I sure can, buddy."

Another time when a man operator answered on a manual exchange, there was a long pause after he acknowledged the number requested. Finally, he came back on the line, all enthused with the remark: "Boy, are you lucky I found it!"

Upon dialing "Operator," you were advised: "This is a recorded message —(pause)—We are sorry we cannot complete your call—(pause)—The operators are on strike." We noted several slightly inebriated gentlemen having a wonderful time arguing with this recorded voice and filling in the pauses with most appropriate and amusing comments.

* * *

A reader asks how dry cell batteries used in magneto telephones should be tested and how often they should be replaced. Telephone companies have developed a variety of systems and routines which are used to replace batteries. Some companies visit each station once each year and replace all batteries. If the dry cells are of a standard telephone type and of uniform quality, this system usually is found to be the most economical and satisfactory from a transmission viewpoint. The period of replacement, also, may be extended to 18 months or longer, depending upon local conditions.

The standard telephone type tester always should be used in testing dry cells. The cheap type ammeters never should be used for this purpose. The standard tester consists of a voltmeter shunted by a resistance of 6⅔ ohms. When this instrument is connected across a single cell, the output voltage, under load, is indicated. Replacement generally is considered necessary when the voltage drops below 0.93 volts per cell.

* * *

A newly designed vacuum switch appears to have numerous special telephone applications when positive action and long life are important. The leads are KOVAR (iron-nickel-cobalt-alloy) welded to Molybdenum rods which are the stationary contacts. Moving contact is also Molybdenum mounted on a Bundy copper-plated steel tubular operating arm which serves as the exhaust or evacuation media. This arm extends through a thin, flexible KOVAR diaphragm at the base of the

cup which permits ready movement of the arm. The tubing is pinched and welded after exhaust; the cup is then cadmium plated. Enclosure in vacuum protects against corrosion and oxidation of contacts. Maximum continuous current rating is eight amperes average.

* * *

The writer was fortunate in being able to witness a demonstration of "Signal Corps Communications," conducted by Maj. Gen. Frank E. Stoner, Assistant Chief Signal Officer of the Army, at the Ninth Annual Banquet

of the Federal Communications Bar Association, held in honor of the members of the Federal Communications Commission in Washington, D. C., on January 11, 1946.

General Stoner, by using radioteletype, started two messages around the world, one being directed east and the other west. These messages were projected on a screen so that they could be watched by the audience as they cleared various points on their round-the-world journey. This exhibition proved most interesting and all marvelled that a message could circle the globe in only a few minutes. Many in the audience sent messages to and received replies from friends in Manila, Tokyo and other points.

* * *

Some of the large telephone companies now are taking an active interest in the preparation of the early history of their activities and also in the preservation of equipment used in early days. This is a commendable practice and one which undoubtedly will result in stimulating the interest of new employes of the industry.

? ? ? Plant Man's Quiz ? ? ?

The "Plant Man's Quiz" department is for your use. Send in questions on any troublesome problems you may have concerning plant construction, repair or maintenance and they will receive the expert attention of Ray Blain, our technical editor. Address your questions to Ray Blain, c/o TELEPHONY, *608 S. Dearborn St., Chicago 5, Ill.*

Q. What is reflection loss as pertains to telephone transmission?

A. The phenomenon of reflection loss occurs in wave propagation of all types. When light strikes the surface of clear water, it travels slower through the water than through the atmosphere. A part of the light also is reflected by the surface of the water. Electrical waves travel over a circuit at a speed dependent on the characteristics of the line. When an electrical wave passes the junction of two transmission lines which do not have the same characteristics, a reflection of energy occurs.

Reflection of energy is know in telephone parlance as "reflection loss." Losses of this type usually occur at the junction of open wire and cable or at the junction of two wire circuits of different sizes. Such losses also occur when equipment is connected which has an internal impedance not equal to the characteristic impedance of the line. Most equipment is designed to cause minimum reflection losses. This is accomplished by its having approximately the same impedance as the characteristic impedance of the line. The characteristic impedance of most open wire lines is from 600 to 700 ohms at 1,000 cycles.

Equipment designed for use on long circuits usually is designed to have an impedance of 600 ohms at 1,000 cycles.

Q. What is considered the most satisfactory location for the installation of sub-station protectors?

A. In general, protectors should be placed as closely as possible to the wire entrance in a building. When located inside a building, they should be in a dry location and should not be near any inflammable material. When placed outside a building, a special weatherproof protector must be used.

Q. What is the usual cause of crosstalk in telephone lines?

A. Crosstalk may be described as intelligible sounds which can be heard on one circuit as a result of transmission of speech on another circuit. The three usual causes of crosstalk are "capacitance effect" and "magnetic effect" between two circuits, and "resistance unbalance." Crosstalk also can result from leakage of current from one circuit to another. The amount of crosstalk experienced depends primarily on the design and construction of the circuits involved. Crosstalk, in general, increases with the expansion in length of parallel circuits.

Crosstalk reduction on open wire depends on resistance balance, configuration of wires on crossarms and transpositions. Resistance balance is accomplished by good maintenance and presents no difficult problems. Transpositions and configuration require special engineering studies.

Q. Will you give us the principal points which should be considered in the adjustment of telephone relays?

A. Two major considerations, mechanical and electrical, must be observed in relay adjustment. Mechanical adjustments are proper gauging, spring tension, contact adjustment and mechanical part alignment. The electrical adjustments consist of the application of current to the winding in a manner similar to that which will be encountered in the circuit under actual working conditions.

Q. We would like to know the definition of noise in the telephone sense and what is its effect on transmission?

A. Noise may be any unintelligible sound which can be heard over a telephone circuit. Crosstalk is a form of noise usually caused by currents induced from nearby power lines. One form of noise known as "babble" is an unintelligible conglomeration of speech sounds induced from several other nearby circuits. This type of noise usually is encountered on cable circuits and may be traced to troubles of various sorts.

The intensity of the noise governs the disturbing effect on the listener. However, it may also depend upon the frequency of the noise producing current. The disturbing effect of noise is usually more pronounced at about 1,100 cycles per second. Noise of all types not only is irritating to the listener as well as a source of distraction, but also, if intense, may reduce the intelligibility of the conversation. Therefore, it is most important that the noise level be held below the level where it will interfere seriously with conversation on any telephone circuit.

V V

Women Hog Party Line As Neighbor's Home Burns

Emmett Township (Mich.) firemen are trying to identify two women who refused to give up a party line while the home of Mr. and Mrs. Ernie McRae was burning.

Mrs. McRae tried twice to get the line, then ran to the home of a neighbor with her infant daughters, 18 days and three years old, respectively. The neighbor, I. H. Whaley, tried four times before he could persuade the women to yield the line. The house was destroyed.

LaVerne Stearman, township fire chief, said he would ask the telephone company to drop the two women from the 10-party line.

V V

Cut 500 Poles for New Line

The newly-organized Cherry Telephone Co., Virginia, Minn., reports it has more than 500 poles cut at Bear River, Minn., from a tract of timber leased from the state to build new lines. Local members went in groups and cut down the poles themselves because they could not hire labor to cut them. They are now negotiating with a logger to have the poles skidded out of the woods.

Nationwide Operator Toll Dialing

FOREWORD

This is the fifth and final article in a series which discusses the Nationwide Operator Toll Dialing Plan. The current article continues the discussion of signaling and miscellaneous matters that affect the operational features outlined in previous articles. The fourth article in this series appeared in the February 2 issue, page 18.

F. E. NORRIS, Chairman
USITA Dial Interexchange Committee

* * *

4.02 Application of Signaling Systems to Trunks and Toll Lines.

4.021 Loop Signaling

(a) General. There are three methods of applying loop signaling to trunks and toll lines:

(1) Reverse Battery Supervision. Reverse battery supervision gets its name from the fact that to change from the on-hook to the off-hook condition, the battery to ground are reversed on the tip and ring talking conductors.

(2) Wet-Dry Supervision. Wet-dry supervision gets its name from the fact that to change from the on-hook to off-hook condition the battery (wet) is removed (dry) from the talking conductors.

(3) High-Low Supervision. High-low supervision is named from the fact that the on-hook (high resistance bridge) supervision is changed to the off-hook condition by lowering the bridged resistance.

(b) For Toll Line Dialing.

(1) Reverse Battery Supervision Trunks. Where the trunk to the local or tributary office is of the reverse battery supervision type and appears on the toll line dialing switches at the toll center for the completion of toll line dialing calls, the toll center end should present towards the local end a polar bridge of not over 600 ohms except during pulsing when the bridge is zero ohms.

The local or tributary office end in this case should present towards the toll center end for the receiver on the hook condition, 48-volt battery on the ring and ground on the tip each through not more than 500 ohms including the resistance of the relay or relays which receive signals from the toll center.

The receiver off-hook condition should be the same as the on-hook condition except that the battery and ground are reversed.

(2) Wet-Dry Supervision Trunks. Where the trunk to the local office is of the wet-dry supervision type the toll center end appearing on the switch banks should present to the local end a non-polar bridge of not over 750 ohms except during pulsing when a polar bridge of about 60 ohms is employed.

In this case, the local office end of the trunk should present to the toll office end during pulsing 48-volt battery on the ring and ground on the tip each through not more than 500 ohms including the resistance of the relay which receives the signals.

As soon as the called line is reached, the battery and ground at the local office end should be reversed as an on-hook signal. This causes the toll office end to "cut-through" after a timed spurt of 20-cycle current has been sent to the local office end to start the machine ringing. The "cut-through" should remove the polar bridge and substitute the repeating coil with its 750-ohm non-polar bridge.

When the called party answers, the off-hook condition should be given. This is a "dry" condition and the battery should be removed at the local office end.

Thus the trunk should be "dry" (no battery) during talking or off-hook and wet (battery) during on-hook.

A serious objection to the use of wet-dry supervision trunks is the "joint control" of release (both the operator and called party must disconnect before the connection is released). This feature is undesirable on toll line dialing calls where the release of the connection should be under the control of the calling operator only.

(3) High-Low Supervision Trunks. These trunks should be used, in the toll line dialing case, from manual tributaries to toll centers to permit the tributary operator to dial subscribers in the toll center or other tributaries of the toll center. They should not be used for dialing between toll centers except on one-way toll lines not used for switching to other toll lines. The Bell System signaling conditions are as follows:

Manual End—Idle or Disconnect Condition. In the idle condition the manual end of this trunk has a high-low polar bridge of about 30,000 ohms including the relay which receives the signals from the toll center end.

Manual End — Seizure Condition. The seizure or plug-in-jack condition is a high-low polar bridge of not over 600 ohms including the signal receiving relay.

Manual End — Pulsing Condition. Usually the pulsing condition is zero ohms in series with the pulsing contacts.

Dial Toll Center End — On-Hook Condition. Usually the dial toll center end in the idle or on-hook condition has 48-volt battery on the ring and ground on the tip each through not more than 500 ohms including the resistance of the signal receiving relay.

Dial Toll Center—Receiver Off Hook. Same as on-hook condition except with battery and ground reversed.

(c) Operator-Office Application of Loop Signaling. Loop signaling operator office trunks may be two-way or one-way in either direction. The operator-office end should use high-low and the dial office end use reverse battery supervision arrangements.

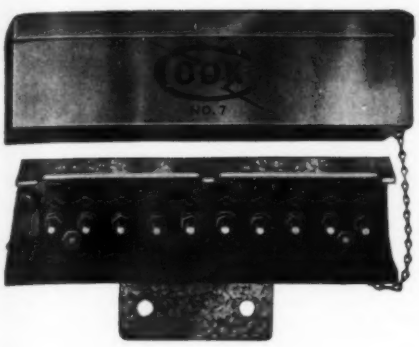
(1) Two-way Trunks between Operator Offices and Community Dial Offices.

Operator Office End — Cord not in Jack. Usually, the resistance of the high-low polar bridge, including the relay which receives the signals from the community dial office, should be about 30,000 ohms when the operator's cord is not plugged into the jack of the trunk.

Operator Office End—Cord in Jack. When the cord is in the jack of the trunk the resistance of the high-low polar bridge should not be over 600 ohms including the signal receiving relay except that it is not over 200 ohms during pulsing.

Community Dial Office End — Receiver On-Hook. Usually the receiver

TOPS *in*



OPEN WIRE PROTECTION

The TYPE 7 HIGH POTENTIAL LIGHTNING ARRESTER

provides lightning protection and static drain for 5 pairs of open-wire circuits. This arrester is also used for the protection of drop wires and cables terminating in unprotected cable terminals where atmospheric conditions require constant static drain.

Insulation and fanning strip are single-piece molded bakelite. Non-corrosive metal hood, Everdur studs, and galvanized mounting bracket assure satisfactory service and long life. Phosphor bronze spring clips accommodate non-grounding, Tru Gap lightning dischargers.

Engineered, designed and manufactured by Cook Electric Company, the Type 7 Lightning Arrester, like all Cook products, is "tops" in performance, and is your guarantee of dependable service.

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on the hook condition should be 48-volt battery on the ring and ground on the tip each through not more than 500 ohms including the resistance of the relay which receives the signals from the toll office.

Community Dial Office End — Receiver Off-Hook. Same as on-hook condition but with battery and ground reversed.

(2) One-way Operator Office Trunk —Outgoing at Operator Office.

Operator Office End—Idle or Disconnect Condition. Signaling bridge should be open.

Operator Office End — Seizure and Holding Condition. Signaling bridge should not be over 700 ohms including the polar relay.

Operator Office End—Pulsing Condition. The pulsing is generally done through a bridge of zero ohms but in any case it should not be over 200 ohms.

Community Dial Office End — On and Off-Hook Condition. Same as for two-way trunk.

(3) One-way Operator Office Trunk —Outgoing at Community Dial Office.

Operator Office End — Cord not in Jack. Usually the resistance of a high-low polar bridge including the relay which receives the signals from the community dial office should be about 30,000 ohms when the cord is not in the jack. This should be the same as for the two-way operator office trunk.

Operator Office End — Cord in the Jack. Usually the resistance of the high-low polar bridge including the relay should not be over 600 ohms. This should be the same as for the two-way operator office trunk.

Community Dial Office End — Idle Condition. Usually the signaling bridge is open. However, in those cases where the two-way trunk is used on a one-way basis the bridge should be closed.

Community Dial Office End — Off Hook Condition. Usually the seizure and off-hook condition should be 48-volt battery on the tip and ground on the ring each through not more than 500 ohms including the resistance of the relay or relays which receive signals from the operator office.

Community Dial Office End — On-Hook Condition. Same as off-hook but with battery and ground reversed.

4.022 Composite and Simplex Signaling. When Bell System composite or simplex signaling is used, the signaling conditions at both ends of the trunk are as follows:

(a) Calling End—Idle or Disconnect Condition. This condition is ground on the signaling lead through the signaling relay winding.

	% Break Will Lie Within Limits Below from 9-11 p.p.s.		
Battery Limits at Calling End 40-56 (2) Volts	**Input Permitted to Signaling Lead at Calling End**	**Output Delivered by Called End When Bell System Circuit Is Used**	
At 40 volts	49.5 - 60.5%	48.5 - 67.5%	
At 56 volts	53.5 - 64.5%	48.5 - 67.5%	
Battery Limits at Calling End 45-50 (3) Volts			
At 45 volts	45.0 - 67.0%	42.0 - 74.0%	
At 50 volts	47.0 - 69.0%	42.0 - 74.0%	(4)

(1), (2), (3) and (4) — See notes below Table II

Table I (CX Signaling) (1). Circuits from toll centers or tributaries terminating in toll centers with battery limits of 45-50 volts (Bell System equipment).

(b) Calling End—Seizure and Holding Condition. This condition is 48-volt battery on the signaling lead through the signaling relay winding. This battery may vary from 40 to 56 volts in manual toll centers, 45 to 50 volts in dial toll centers, and 42 to 56 volts in community dial offices.

(c) Calling End—Pulsing Condition. Pulses are intervals of ground on the signaling lead corresponding to the "break" of the usual dial. The limits of pulses delivered to the sending lead of the composite signaling circuit at the calling end are shown in Tables I and II: These tables show the output of the corresponding circuit when it is also used at the called end. The limits shown for both the calling and called ends are for the "worst circuit condition."

NOTE: The arrangement of the Bell System composite and simplex circuits is such that very little change is required in the composite and simplex signaling equipment units of either the Bell or Independent manufacturers to permit them to operate satisfactorily with the Bell type on one end and the Independent type on the other.

The interdigital time usually provided by senders is 0.6 secs. The minimum interdigital time when dialing should be as near 0.6 secs. as feasible in order to allow time for trunk hunting.

The re-ring signal used on trunks employed by outward operators to reach other operators on a dial basis should be a pulse of 50 to 120 milliseconds duration.

	% Break Will Lie Within Limits Below from 9-11 p.p.s.	
Battery Limits at Calling End 45-56 (1) Volts	**Input Permitted to Signaling Lead at Calling End**	**Output delivered by Called End If Bell System Circuit Were Used**
At 40 volts	46.0 - 65.0%	45.0 - 72.0%
At 56 volts	46.0 - 65.0%	41.0 - 68.0%
Battery Limits at Calling End 45-50 (2) Volts		
At 45 volts	45.0 - 67.0%	42.0 - 73.0%
At 50 volts	47.0 - 69.0%	42.0 - 73.0%

NOTES FOR TABLES I AND II

(1) The limits shown in the tables are for step-by-step intertoll dialing in the 45 to 50 volt cases. Where common control switching intertoll dialing (senders) is used, the % break limits should be easier to meet.

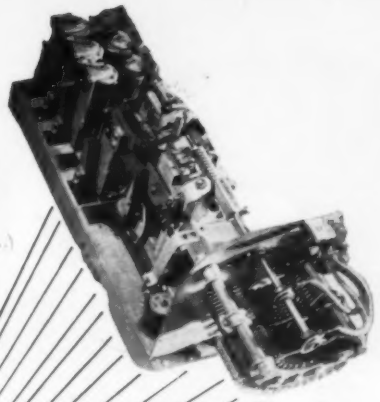
(2) This would apply to a toll office without intertoll dialing switches.

(3) This would apply to a toll office with intertoll dialing switches.

(4) The extreme limits (42 - 74%) will be obtained at the contacts of the incoming CX relay *only* with *through dial switching* at the calling end and all involved circuits in the *"worst circuit condition."* Since the probability of getting the extreme limits (42 - 74%) is very small it is felt that a band 4 to 6% narrower than this may ordinarily be expected.

Table II (CX Signaling) (1). Circuits from toll centers to community dial offices with battery limits of 42-52 volts (Bell System equipment).

all these "Cities in the News" *are* STROWGER AUTOMATIC



LONDON, ENGLAND, Nov. 1, (Thurs.)

TORONTO, CANADA, Nov. 30, (Fri.)

BERLIN, GERMANY, Nov. 7, (Wed.)

ATHENS, GREECE, Dec. 6, (Thurs.)

BAGHDAD, IRAQ, Nov. 16, (Fri.)

MELBOURNE, AUSTRALIA, Dec. 1, (Sat.)

HONOLULU, T. H. Nov. 12, (Mon.)

HARBIN, MANCHURIA, Nov. 23, (Fri.)

MEMEL, LITHUANIA, Nov. 15, (Thurs.)

HAVANA, CUBA, Nov. 20, (Tues.)

BOMBAY, INDIA, Nov. 20, (Tues.)

SAO PAULO, BRAZIL, Nov. 21, (Wed.)

You read their names every day — these important foreign cities which play leading parts in world news. It is significant that each and every one of these major cities is served by Strowger Automatic equipment. Here — in actual service under widely varying conditions—Strowger equipment has *proved* its worth.

CHUNGKING, CHINA, Nov. 6, (Tues.)

ROME, ITALY, Nov. 25, (Sun.)

TEHERAN, IRAN, Nov. 8, (Thurs.)

VIENNA, AUSTRIA, Dec. 4, (Tues.)

BELGRADE, YUGOSLAVIA, Nov. 24, (Sat.)

LISBON, PORTUGAL, Dec. 15, (Sat.)

MANILA, P. I. Dec. 24, (Mon.)

BUENOS AIRES, ARGENTINA, Nov. 14, (Wed.)

JOHANNESBURG, SO. AFRICA, Nov. 10, (Sat.)

STROWGER AUTOMATIC TELEPHONE EQUIPMENT
IS NOW IN USE IN
70 COUNTRIES THROUGHOUT THE WORLD

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Makers of Telephone, Signaling and Communication Apparatus . . . Electrical Engineers, Designers and Consultants

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UP and OVER

—and all by itself!

Here's one of the secrets of Strowger Automatic equipment — a feature that sets it apart. Each Strowger switch is a unit in itself, with its own contact banks, and wipers driven by its own power. It is virtually a switchboard in miniature — mechanically independent and self-contained.

Thanks to this "unit" design, Strowger equipment provides:

FLEXIBILITY — Standard Strowger equipment units can readily be combined to fit any building layout — to meet any service requirement. Throughout its life, the equipment can be rearranged as required, to meet changing conditions.

EASY GROWTH — A Strowger Automatic exchange can be built up to full capacity by simply adding switch units without disturbing equipment already installed. For further growth, new "frames" can be added, and equipped to provide additional service.

EFFICIENCY — Strowger Automatic equipment draws power only for the switches actually in use, and only *while* they are in use. Thus, its operating efficiency remains high, through all fluctuations in load.

MINIMUM MAINTENANCE — Because of its simple "unit" design, Strowger equipment is easy to understand and to maintain. Its extraordinarily low maintenance cost is a matter of definite record with hundreds of telephone companies who have used Strowger equipment through the years.

Only Strowger Automatic equipment provides all these advantages. No other equipment can promise better results for you — and none can back up its promise with an equal record of performance!

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4.023 AC Signaling. This method should be used only on intertoll trunks. AC signaling is required where DC channels cannot be made available, as, for example, with carrier systems such as Types C, H, J, K and L, and more information on this subject will be made available later.

B. Termination of Operator Office Trunks

There are numerous advantages both from the standpoint of toll dialing and of operator office operation that result from the termination of operator office trunks on incoming switches at community dial offices. It is fundamental to toll dialing operation that the originating operator have at all times positive indication as to when the switching equipment is available to receive dial pulses and when to stop dialing if at any point in the connection equipment is not available to receive any pulses not yet dialed. When operator office trunks are terminated on incoming switches the lamp signal which indicates to the originating toll dialing operator that she may dial should continue lighted throughout the dialing operation, thus making interruption or waiting on the part of the operator unnecessary.

This advantage comes about because the incoming trunk is directly connected to a switch which has access to subscriber lines and the equipment is always available to receive pulses after the trunk has been seized. Furthermore, when the operators at the operator office are accustomed to reaching customers at their exchange or at the community dial offices served by them without waiting for start dialing indication considerable operating and service advantages accrue from having all offices with which they work uniform in this regard. The larger the operator office and the greater the number of community dial offices served from the operator office, the more important this consideration becomes.

There are other advantages that accrue from incoming switch termination of operator office trunks. Incoming switches should provide access at all times even though all subscriber switching paths are busy or out of order. This is especially important during periods of overload or in emergencies. With incoming switches verification service can be obtained at a small cost per incoming switch, whereas with line circuit termination a much greater cost is involved since each link or talking path in the office must be provided with this feature. With incoming switch termination a reduction of one or two subscriber links can ordinarily be made from the number required where the trunks are terminated on line circuits.

The trunks from an operator office may, of course, be terminated on line circuits at a community dial office in the same manner as subscriber lines instead of incoming switches. When operator office trunks are so terminated and the community dial office is to be connected with the toll dialing network, arrangements need to be made at the community dial office to provide the start dialing signal to indicate to the calling operator or to the sender that the equipment in the community dial office is available to receive dial pulses. It should be noted, however, that an operator originating a call for an office equipped in this manner must wait for the start dialing signal after the trunk to the community dial office has been seized before dialing the called number. If for any reason the start dialing signal is not observed, a partial dial may occur or a wrong number may be reached.

In small offices of less than 30 lines the relative cost of incoming switches is greater than line circuits, since the same number of links will, in most cases, be required with either arrangement of trunk termination. Also, the ratio of trunks to lines in these offices is higher and this results in a relatively higher cost per line for incoming switches.

As in the case of the start dialing signal, it is fundamental that with either type of trunk termination the flashing signal (60 IPM) with busy tone to the calling operator when a busy line is encountered be provided for toll dial operation.

V. TRANSMISSION CONSIDERATIONS

The transmission objectives for connections established by means of toll line dialing should be the same as for connections set up on a manual basis. However, the changes in traffic arrangements in Independent company areas resulting from the introduction of dial operation may lead to plant rearrangements affecting transmission.

>> *The first commercial telephone switchboard placed in service in New Haven, Conn., on January 28, 1878, employed a method of signalling accomplished by sending over the line to the subscriber's station, current from a buzzer known as "Coy's Chicken." This buzzer caused all receivers on the line to give out a grating sound which attracted the subscriber's attention. If the wanted subscriber heard the grating sound and answered, all others presumably hung up—unless they were interested in the affairs of their neighbors.*

>> *Paul Porter, chairman of the FCC, was asked by the telephone company if he wanted an unlisted number.*

"It makes no difference," sighed the father of pretty and personable Betsy Goodloe Porter, "I have a 14-year-old daughter and nobody can get through those busy signals on our home phone."

>> *In 1904 a writer suggested that there should be a word to cover a conversation held over a telephone. He said, "It is a waste of time to say 'referring to our conversation held over the telephone.' There should be a good word evolved to cover this. 'Telelogue' has been suggested. This means a word from afar. While the word seems to cover the point it is not very euphonious."*

>> *Telephone lines are like highways—when too many persons want to travel the same road at the same time a traffic jam results.*

MINNESOTA CONVENTION

Draws Record Attendance

By R. C. RENO
Editor of TELEPHONY

NEARLY 500 telephone men and women from Minnesota and neighboring states attended the 37th annual convention of the Minnesota Telephone Association on January 28, 29 and 30 in St. Paul. This was an all time record attendance in the history of Minnesota conventions. A greater part of those attending were representatives of medium-sized and smaller Independent companies. Of course, this is not unusual in the case of the Minnesota association as its convention programs have always been centered around the problems and operations of small companies. This year's program was no exception.

As in previous years, the last session of the convention, on the morning of January 30, was given over completely to round table discussions of small company problems—accounting, plant and commercial—and even though it was the last meeting on the program, the attendance at this session was as large as at other sessions.

The manufacturers and suppliers came in for unusual attention during the convention. They were constantly answering questions concerning new developments and products that have been produced or designed. This trend definitely indicates the increasing interest on the part of small companies to adopt the latest up-to-date equipment and practices in their operations.

The directors of the association again selected one of the Independent industry's younger executives to lead the association during the coming year when they elected Charles R. Cashel, Worthington, secretary and manager of the Worthington Telephone Exchange Co., as president. Irving Todd, secretary and treasurer of the Hastings Telephone Co., was elected vice president and J. C. Crowley, Jr., was named secretary-treasurer. Directors re-elected were P. M. Ferguson, Mankato; J. P. Keane, Pine Island; H. P. Sentman, Fairmont, Mr. Todd and Vies Martinsen, Sebeka. James Boyd, Alexandria, and C. M. Ostby, Erskine, were elected directors to fill vacancies created by the death of Leland Wright, Alexandria, and by the retirement of H. F. Lueders, Norwood.

Mr. Lueders who has served the Minnesota association as a director and officer for many years announced his retirement from the telephone business and the convention adopted a resolution expressing its appreciation for his years of faithful service and elected him an honorary member of the association. Resolutions commemorating the death of Mr. Wright and A. E. Wilcox, Bricelyn, were also adopted.

In his annual address President Warren G. Clay, Hutchinson, commended the United States Independent Telephone Association for its effort in rendering specific aid to the small Independent companies in solving the many problems confronting them. He particularly emphasized the work of the Toll Compensation & Settlements Committee, Plant Committee, Employment Relations Committee and the Advertising Committee.

In tracing the activities of the Minnesota association in the past year Mr. Clay reported that Secretary Crowley had aided 20 small companies in securing rate increases and had rendered help to many more in preparing applications for increases not yet passed upon by or presented to the Minnesota Railroad & Warehouse Commission.

Mr. Clay urged all small companies to give immediate consideration to the improvement of service and to the securing of adequate rates during the next year.

In an interesting address W. E. Pothem, St. Paul, executive assistant, Northwestern Bell Telephone Co., described the part the telephone industry played in perfecting radar equipment and technique during the war. He also discussed other wartime developments coming from telephone laboratories such as Spiral-4 and coaxial cable and

CHAS. R. CASHEL

J. C. CROWLEY, JR.

the lip and throat microphones. He also told of the Bell company's current experiments with power line carrier and mobile radio-telephone service.

"Advertising" was the subject of an address of C. C. Pearce, Riceville, Iowa, member of the USITA Advertising Committee. He urged that all companies plan and carry out a definite plan of advertising in their local newspapers in order to keep the public informed of problems confronting them and in order to secure new business and improve their public relations.

He told of the work of the national association's Advertising Committee in setting up the Telephone Advertising Institute which prepares all types of advertising material for the Independent industry at a very low cost.

E. H. McGarvey, St. Paul, representative of the Northern States Power Co., spoke on "Joint Use." He outlined the advantages of joint use of poles by power and telephone companies to eliminate bad clearances and in reducing the number of pole lines in streets, alleys and highways. He stated that joint use was particularly desirable in cities, towns and villages and in the territory immediately surrounding them.

A detailed explanation of the miscellaneous taxes on telephone service was given by G. W. Anderson, St. Paul, chief of the miscellaneous tax division, Internal Revenue Department.

One of the most interesting and enlightening addresses heard on any convention program was that of Gordon Volkenant, Minneapolis, research engineer, Minneapolis Honeywell Regulator Co. Speaking on "Electronics—the Magic of War and Peace," Mr. Volkenant explained, in non-technical terms, the development of the vacuum tube and its use in designing many of the automatic controls used in bombers and other aircraft during the war.

Gov. Edward Thye briefly addressed the convention and paid tribute to private enterprise for its wartime and peacetime accomplishments in making the United States the most outstanding and strongest nation in the world. He particularly commended the telephone industry for its work in furnishing efficient and rapid communications which is so vital to the economy of the nation.

Stafford King,, St. Paul, state auditor of Minnesota, veteran of World Wars I and II who recently returned from the Pacific, gave a stirring address on the experiences and difficulties of the armed forces in that area, and told of the ingenuity and stamina of our soldiers in overcoming the almost

IRVING TODD

impossible tasks in conquering the Japanese.

W. C. Henry, Bellevue, Ohio, president of the USITA, speaking on "National Telephone Problems," gave a complete and detailed analysis of the problems facing the Independent industry in supplying the greatly accelerated postwar demand for telephone service. He stated that the Independent industry faced the greatest challenge in its history in meeting the public's demand for more and better telephone service. He urged all companies to formulate and effect plans for the additional plant facilities that are needed to render an expanded and improved service, warning that if the industry does not take care of this obligation some other agency is likely to enter the telephone picture. He particularly emphasized the need of extending and improving rural service, and recommended that Independent companies consider the adoption of more liberal construction charge policies for rural subscribers.

Mr. Henry discussed the so-called Pepper Bill pending in Congress which would increase the minimum wage to 65 cents, 70 cents, and 75 cents over a period of four years. He asked all companies to tell their congressmen the effect that such rates would have on the operation of small companies and urge the adoption of a provision which would exempt telephone exchanges having less than 1,000 stations.

The USITA president told of the developments in connection with the nationwide toll dialing system and the use of radio in serving isolated rural areas where physical construction is prohibitive, and in giving mobile radio-telephone service.

He warned that all Independent companies must keep abreast of all new telephone developments and those which are being designed to supplement telephone service in order to be in a position to adequately serve the public.

The manufacturers' problems in meeting the increasing demand for telephone equipment and supplies were discussed by N. H. Saunders, Chicago, chief engineer of the Kellogg Switchboard & Supply Co. He explained that the manufacturers' problem of reconverting from a wartime to a peacetime operation is almost as difficult as it was when they went on a wartime basis from peacetime operation, and that operating companies cannot expect immediate production and shipment of major telephone apparatus simply because the shooting war has ceased. He pointed out that there still are shortages of manpower and materials which naturally retard the production of the manufacturers and suppliers. However, he recommended that operating companies place their construction and rehabilitation plans on paper in order to get their orders on production schedules so that the manufacturers will have some idea of their future requirements.

As previously stated the last session of the convention, on the morning of January 30, was one of the most popular and best attended meetings. It was in the form of a round-table discussion at which representatives of small companies led most of the discussion and in which small company men felt free to ask questions and express their opinions concerning all phases of the operating business.

Following are the featured topics and discussion leaders at the final session: (1) "The Importance of Proper Accounting Methods"—A. N. Fancher, supervisor of telephones, Minnesota Railroad & Warehouse Commission, St. Paul; (2) "Answers to Accounting Problems"—T. C. Macoubrey and F. L. Wetch, public accountants; (3) "Reconstruction and Reconversion — the Importance of Plant Engineering in Contemplating Reconstruction and Reconversion" — M. F. Wickman, engineer, Northwestern Bell Telephone Co., Minneapolis; (4) "Answers to Cable Planning, Maintenance and Repairs"—Eldon Eckles and James Herring; (5) "Rural Pole Line Construction — Types and Methods" — P. M. Ferguson, H. E. Clayton and Vies Martinsen; (6) "Experiences with Mechanical Hole Diggers" — C. F. Angell, George Heck and W. B. Clay; (7) "Subscribers' Station Equipment, Maintenance and Inspection" — E. L. Klingel and Daniel McNulty.

NORTH DAKOTA FARMERS HELP

Build Telephone Systems

DISPLAYING a warborn spirit of cooperation, a group of farmers in the Red River Valley of North Dakota who wanted telephones and understood why the Northwestern Bell Telephone Co. was unable to provide service, pitched in, dug pole holes, unloaded equipment from boxcars and did everything possible to make up for the labor shortage that would have halted any attempt by the telephone company to construct new lines during the war period. As a result of the farmers' willingness to help the company provide telephone service to its members, an area around Fargo and Moorhead, N. D., exceeding the size of greater New York by almost half the area of Rhode Island recently was opened to telephone communication. The Comstock, N. D., exchange is the first postwar exchange to be opened in states served by Northwestern Bell and is probably the first new exchange in the United States since the end of the war.

Although every one of the projects that make up the communications system in the area was started in wartime, no substitute materials were used, no makeshift compromises were made in equipment or service. Every telephone is a new type dial instrument especially designed for rural use.

Citizen and farmer committees at Harwood, Chaffee and other towns sparked the enterprise, according to a story of the project by the Fargo *Forum*. But the first community to begin working for telephone service was Comstock and its activities formed the pattern for other installations.

Comstock farmers were the first to circulate petitions for telephone service. In January, 1945, a committee of farmers and business men from Comstock walked into the offices of the Northwestern Bell in Fargo. Their request was no different than other requests the company had been hearing —they wanted telephones. At that time Comstock could boast but one telephone —a toll telephone in a local garage. Yet Comstock and its area was rich, its sugar beets and farm produce formed an important part of the wealth of the Red River Valley.

The company listened to the request. What kind of service did Comstock want? Did they just want their own private exchange? No, the committee said they wanted to be able to talk to Fargo.

The company officials explained that, although it was possible to obtain the telephones, poles and wire, there always would be the problem of labor.

The answer to the labor shortage was that the people of Comstock, and a few interested folks from Hickson, just across the Red River in North Dakota, wanted telephone service badly enough to meet in the school auditorium and pledge a certain number of days of work to dig holes and erect poles. They signed for service and arranged to pay for the cost of construction by doing most of the labor.

Here was something new. In the past, farmers frequently have eased the cost of construction charges on rural lines by aiding the company in the actual labor of building the line on their property. But never before had an entire community unanimously backed such a project.

The Comstock-Hickson project became the problem of Thomas J. Bolger, Northwestern Bell's Fargo district manager. Mr. Bolger began preliminary work on the project at once. An automatic dial switchboard was ordered. Trips were made into Minnesota to buy poles; high tensile strength wire arrived. Just how eager the people were to help became apparent when Mr. Bolger found that a carload of poles had arrived at Comstock and before he could get to the car Roy Gunderson, committee member, had rounded up some of the men and had it unloaded. The hardware, brackets and crossarms arrived, and were unloaded.

C. P. Quallie, Comstock postmaster, kept one eye on his postoffice and one on the poles as he "gained" them—cut the squares and drilled the holes for the bolts which would hold the crossarms. While the farmers seeded their ground, men in town prepared 1,200 holes for use.

In the spring of 1945, water stood in the fields. Surveying in some cases had to be done by men in hip boots. But the work went on.

Mr. Bolger had been scouring the territory for a tractor to use in digging pole holes and was able to borrow one. Dan Bernier, the garageman, bolted on a post hole digger and work began. The first pole was placed in Comstock by Roy Gunderson, Ray Wedan, the general store owner, Harold Shellito and Walter Bjerk, of the Northwestern Bell company. They celebrated the occasion by digging some more holes.

In other communities farmers heard of the Comstock plan and organized their own committees. Thus the new lines at Leonard, Harwood and other towns began.

By that time the company had invested over $30,000 in the Comstock project. Through the summer the men worked on. Whenever a farmer wasn't busy he would lend a hand with the telephone work. Ray Bernier, son of the garageman, and Harold Shellito completed their quota of holes and decided after dinner to go out and dig another mile of holes. Walt Bjerk, usually alone, directed the construction for the company.

Wives, to whom a telephone meant relief from lonely winters, also helped and used their spare time to get right of way permits allowing the company to place poles on private property. O. R. Koester, 67-year-old retired carpenter, spent his time fastening cross bars to the poles, even though he has but one good hand, fingers of the other having been crushed in an accident.

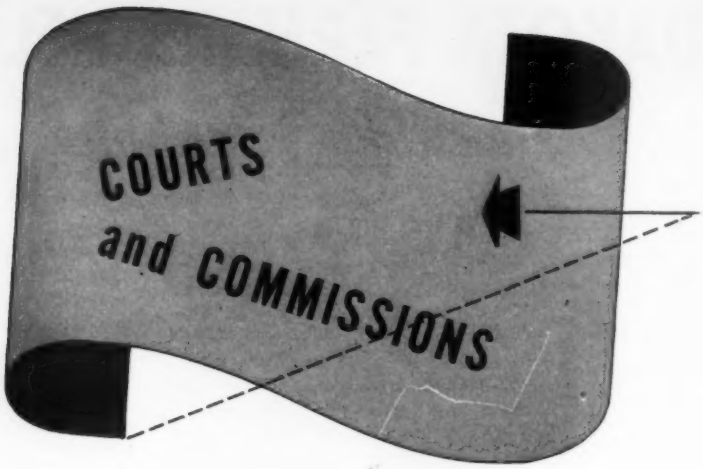
In the middle of September with most of the poles in place, telephone linemen began putting up the first line of the 223 miles of wire that was to go into the Comstock project. After many delays the switchboard arrived.

After the installation of the switchboard, telephone company employes moved into Comstock in force for the first time. Previously almost all of the work except the actual wire stringing had been done by Walter Bjerk and the willing farmers and tradespeople.

On December 21 testing had been completed and the switch was thrown in. Seven-year-old Sybil Gunderson, daughter of Roy Gunderson, the elevator manager who had wanted a telephone badly enough to do something about it, made the first official call and opened the line.

The world has been brought inside homes in the area—because of the telephone, and a community spirit that must be called "cooperation" for want of a better word.

(Please turn to page 36)



FCC Rejects Proposal On Radio Channel Allocations

The Federal Communications Commission on January 24 denied the petition of the Zenith Radio Corp. and the General Electric Co. to have the radio channels in the 42 to 50 megacycle band set aside for the exclusive use of FM broadcasting.

Early in 1945 the FCC held hearings on the allocation of radio frequencies and in May of that year, at the request of the telephone industry, the commission allocated the radio channels in the 42 to 50 megacycle band for common carrier highway mobile and radio-telephone service. Both the USITA and the Bell System presented testimony at the hearings and later submitted briefs.

At the hearing on January 8 of this year, both the Independents and the Bell System registered protests against the petitions of the Zenith and General Electric to disturb the allocation of the above mentioned channels.

V V

Federal Tax on State Business Upheld in Supreme Court

Although it did not involve the telephone or other utility business, the recent decision of the U. S. Supreme Court in the Saratoga Springs case was being studied carefully by utility observers in Washington for its possible effect on future government activities in the field of public utility service. The majority of the court, in a decision which split four ways, upheld the constitutionality of a federal tax on business activities of the state of New York in the form of selling bottled mineral waters from the famous spa.

The decision is based principally on earlier precedent to the effect that state retail liquor business (S. C.), and also state railway operation (Mass.), validly could be taxed. All eight justices, including the two dissenting justices (Douglas and Black), conceded that there could be no rational distinction between taxing South Carolina's hard liquor business and New York's soft drink business.

If the opinion of Justice Frankfurter indicates how a majority of the court would rule on attempts to tax other types of government business activities, this Saratoga Springs case may be far-reaching indeed. Justice Frankfurter (who, incidentally, continues to lead the right wing of the court) lays down the broad principle that "So long as Congress generally taps a source of revenue by whomsoever earned, and not uniquely capable of being earned only by a state, the Constitution of the United States does not forbid it, merely because its incidence falls also on a state." Actually applied, this doctrine would authorize taxation of any government business or earnings from government business, provided only such business is of a type in which private enterprise ordinarily also is engaged.

The Frankfurter opinion admits that Congress could, by statutory action, enact tax exemption for such business. But his opinion emphasizes that if Congress does not make such positive exemption, the Constitution, itself, does not forbid the tax. The justice's dictum would amount to a green light for congressional removal of present tax discrimination in favor of public ownership activities generally.

Although the Frankfurter opinion purports to be the opinion of the court in this case, the special concurring opinion by Chief Justice Stone raises serious question whether a majority of the court is prepared to go as far as Justice Frankfurter. It is the Stone opinion which packs the real voting power of the court. (He was joined by Reed, Murphy and Burton.) The chief justice is satisfied to let the Saratoga case be confined only to the bottling works activity of the state of New York. He would have questions of taxation on other forms of state enterprise examined and decided on their own merits. "The problem is not one to be solved by a formula . . ." The Rutledge opinion involves only a minor angle.

Dissenting opinion by Justice Douglas discloses the real potentiality of the Saratoga Springs case with respect to activities of the government in the utility field. It displays a fear that not only the Saratoga Springs case but the earlier decisions along the same line are creating a network which eventually will destroy the tax exemption privileges now widely enjoyed by public ownership activities in utility enterprise. Justice Douglas says: "Many state activities are in marginal enterprise where private capital refuses to venture. Add to the cost of these projects a federal tax and the social program may be destroyed before it can be launched."

One positive result of the Saratoga Springs decision, which may find fruitful application to future questions of taxing public ownership operations, involves the question of a state's right to dispose of its own natural resources, and to develop its own conservation policy without hindrance of federal taxation. New York State had argued that its mineral waters are a natural resource of the state and that its bottling enterprise was a form of carrying out its conservation policy with respect thereto. Similar claims are made regarding public hydro operations. Justice Frankfurter disposes of this argument briefly, in addressing a hypothetical state government: "You may carry out your own notions of

social policy in engaging in what is called business, but you must pay your share in having a nation which enables you to pursue your policy." There was no dissent on this point in the Stone opinion.

V V

Rural Residents Seek Adequate Telephone Service

The North Carolina Utilities Commission has received a petition asking that it see that "proper and adequate" telephone service is provided for an area in Forsyth County, south and southwest of Winston-Salem.

Two telephone companies are involved, the Southern Bell Telephone & Telegraph Co. and the Oldtown Telephone System, Inc., which operates in the rural areas near Winston-Salem. A hearing on the matter is to be held in Raleigh February 21.

The petition was signed by 83 residents of the Lewisville or Country Club Road and the Boyer Mill Road, who said they were receiving no telephone service now. Sixty-two members of the Clemmons Civic Club also endorsed the request.

V V

John Shaughnessy Dies; Former Nebraska Commissioner

JOHN F. SHAUGHNESSY, 71, former head of the Nevada Public Service Commission, died January 23 in a Reno hospital.

Mr. Shaughnessy became a member of the Nevada Railroad Commission when it was organized in 1907. The agency later became the Nevada Public Service Commission and Mr. Shaughnessy was named chairman, in which position he continued to serve until 1935, when he was succeeded by Harley A. Harmon of Las Vegas. Three daughters and two grandchildren survive.

V V

Racine, Minn., Company Sold To Vies Martinsen

Sale of the Racine (Minn.) Telephone Co. by A. J. Simpson to Vies Martinsen was authorized February 1 by the Minnesota Railroad & Warehouse Commission. Mr. Martinsen will operate the property under the name of Racine Telephone Co.

The commission in approving the sale gave no consideration to any increase or change of rates or diminution of service in the territory.

V V

Mankato, Minn., Company Buys Maple River Property

The Mankato (Minn.) Citizens Telephone Co.'s purchase of certain telephone properties of the Maple River Telephone Co. in Good Thunder and

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Beauford townships, Blue Earth County, was approved January 28 by the Minnesota Railroad & Warehouse Commission.

The rural rates now on file with the commission for the Mankato company's Good Thunder exchange (TELEPHONY, December 29, page 28) became effective in its new territory upon consummation of the sale.

V V

Author Gets Telephone Company as Loan Payment

Louis Bromfield, author-farmer, went surety several months ago for the Lucas Telephone Co., a rural party line with 142 subscribers along its 28 miles of line, to ensure telephone service to his farm home near Mansfield, Ohio. Today he is the unwilling owner of the telephone company.

Company directors, who did their own maintenance work, last year sold out to George Hubler of Lucas, who borrowed $1,000 from Author Bromfield to clinch the deal. Owner Hubler tired after nine months of trying to keep outmoded equipment functioning, however, and mailed Mr. Bromfield a bill of sale for the entire company in payment of his loan.

Mr. Bromfield is trying to refuse ownership. His counsel has asked the Common Pleas Court to name a receiver who could sell the company to a competent operator.

V V

Buys Minnesota Independent

The Western Telephone Co. was authorized January 28 by the Minnesota Railroad & Warehouse Commission to buy the Breckenridge (Minn.) Telephone Co. and operate it under the purchaser's name. No approval was given by the commission as to rate increases or changes in the territory.

V V

Drops Installation Charge

The Oakdale (Neb.) Telephone Co. recently obtained authority from the Nebraska State Railway Commission to annul installation charges on its rate schedule during 1946 as a business primer for the ensuing 12 months.

V V

North Carolina Company Sold

The North Carolina Utilities Commission has approved the purchase of the Eastern Telephone Co., Robersonville, N. C., by the Carolina Telephone & Telegraph Co., Tarboro, N. C. The exchange serves more than 500 customers.

Summary of Commission Rulings and Hearings

California Railroad Commission

January 25: Hearing on request of Los Gatos (Calif.) Telephone Co. for authority to change directory advertising rates and conditions.

Illinois Commerce Commission

February 5: Hearing on application of Urmaoga Telephone Co. for rate increases at Ursa and Lima.

Minnesota Railroad & Warehouse Commission

February 25: Hearing on application of City & Farmers Telephone Co., Rushford, for authority to increase rates.

February 27: Hearing on application of McLeod County Telephone Co., Glencoe, for authority to increase rates and install dial service at Buffalo Lake.

Oklahoma Corporation Commission

February 20: Hearing continued on application of Farmers Mutual Telephone Co., Weatherford, for authority to make extra charge of long distance calls through Southwestern Bell.

February 21: Hearing on show cause order against Southwestern Bell Telephone Co. of Oklahoma concerning enforcement of tariff rates at hotels.

April 1: Hearing continued on application of Fred Barrett to require Oklahoma Automatic Telephone Co., Kiowa, to restore and improve service at Clarita.

V V

Install New Cables at De Queen, Ark.

The De Queen (Ark.) Telephone Co. now has construction work under way to improve service and to extend it to many new customers, according to Waverly Wommack, manager.

New cables, totaling about three miles in length, are replacing the old installations and are being extended to take in more residential areas, Manager Wommack said.

The construction is expected to be completed within a few weeks. Mr. Wommack said that improvements in the service at Horatio and Lockesburg, Ark., also are being planned.

V V

Frank Solberg Appointed Manager at Langdon, N. D.

Frank Solberg was recently appointed manager of the Central Telephone Co., Langdon, N. D.

Mr. Solberg has been with the Central Telephone Co. for 18 years, starting at Cavalier, N. D., where he was employed nine years. He was employed later at New Rockford and Devils Lake until he entered the Army.

Mr. Solberg was in the Signal Corps about three years and practically all of the time on foreign duty in Alaska as a master sergeant on telephone construction work.

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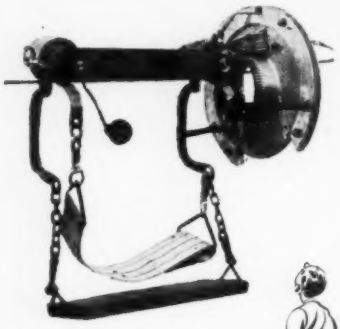

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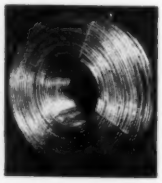

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VETERANS WANT TELEPHONE WORK

IN AN effort to be of assistance to returning veterans, as well as to telephone companies which have a manpower shortage, we expressed to the Office of the Chief Signal Officer of the Army our willingness to publish the names and addresses of Signal Corps men who desire to enter telephone work. The Chief Signal Officer accepted our offer and advertisements were run in the post papers of Fort Monmouth, N. J., and Camp Crowder, Mo., announcing our plan. To date we have received letters from the following Signal Corps men, asking that they be listed. It is suggested that any telephone operating or manufacturing company desiring men with their qualifications write them immediately. (Previous names were published in the November 3 and 17, December 1, 15 and 29, January 5 and February 2 issues.)

* * *

ENSIGN WARREN HELBERG, 5322 MAFFITT AVE., ST. LOUIS, MO. Graduate Missouri School of Mines & Metallurgy in 1944 with B.S. in electrical engineering. Twenty months' experience with navy underwater sound equipment, basically radio gear. Desires employment with operating company. Expects to be discharged about February 15.

* * *

SGT. GEORGE E. JENKS, AITKIN, MINN. Signal Corps switchboard repairman. Expects to be discharged by end of February. Seeks employment with operating company or manufacturer preferably in vicinity of Aitkin.

* * *

CAPT. WALTER KNAPP, R. R. 3, WATERLOO, IOWA. Five years army signal work. Radio operator, radio and telephone repairman and communication officer in tank battalion. Wants employment with radio division of operating company.

* * *

JOHN C. FULTON, 205 KELTON ST., ALLSTON 34, MASS. Wants work with operating company near Boston. Three years in Army Signal Corps as radio operator, land and ship, maintenance and operation.

* * *

LT. EDMUND A. SEIZ, HQRS., 32d SIGNAL TRNQ BN., CAMP CROWDER, MO. Lieutenant Seiz and two other veterans are desirous of buying, leasing, renting or operating an Independent exchange in New York state or in the New England states.

The three veterans have a combined knowledge of inside and outside plant, both magneto and common battery. Lieutenant Seiz states that their desire is no idle fancy and careful consideration has been given to the proposition. Correspondence from interested parties will be welcome.

* * *

HARRY GOLOSINSKI, 1654 W. 15th ST., CHICAGO 8, ILL. Four years in Signal Corps. Experienced in outside construction. Prefers outside work with operating company.

* * *

R. L. HARLOW, 817 LAKESIDE PLACE, CHICAGO 40, ILL. Recently discharged from Army. Had 1½ years' intelligence work overseas with Army; organized and operated signal corporations in Europe and United States prior to the war. Wants position as manager of medium-sized company or distributorship for well established supply house. Reasonable capital for possible partnership or outright purchase of existing concern.

* * *

FRANCIS P. STAHLINSKI, 230 MT. PLEASANT ST., NORWICH, CONN. Expects discharge in February. Signal Corps experience in line work such as rapid construction with open and field wire, overhead and underground cable. Experienced as radio and switchboard operator. Most interested in cable work with operating company.

* * *

EDWIN J. ROBERTS, JR., 7 STEUBEN ST., HOLLAND PATENT, N. Y. Expects to be discharged in February or March. Three years in service, two in communication. Did line work, telephone and switchboard repair. Interested in any work in or connected with telephone industry.

In The Nation's Capital

(Concluded from page 17)

cost system of accounts (adopted in 1937) . . ."

The company also argued that the FCC had no power to order a reclassification of entries for plant which has already been retired, but the Supreme Court rejected this contention, saying that "the effect of appellee's argument would be to render the commission powerless to write off much of the inflation caused by the original accounting in this case."

Altogether, the Rutledge opinion follows — with respect to regulatory accounting practices — the general "hands-off" pattern laid down in the Hope case (1944) with respect to rate-fixing theories. Whatever a commission does is presumed to be all right with the highest court, except under most unusual circumstances. Cynical writers have called it the "Pontius Pilate" doctrine whereby the court refuses to pass on the merits of any such issues, but merely washes its hands of the whole controversy by passing the buck to the commissioners. Rutledge insists that the court will not take sides in "a debate in accounting circles" as to whether prices agreed on between affiliates are a poor criterion of value. He affirms that such discussion was and is for the regulatory commissions "and not for the courts." Chief Justice Stone dissented.

* * *

Divestment of Western Electric from the AT&T system? Such a proposal has been made by Commissioner Jourolmon of the Tennessee Railroad & Public Utilities Commission, who points to the threatened nationwide tie up of telephone communications, because of a labor controversy at Western Electric, as a specific reason for breaking up the AT&T holding company system. Jourolmon called attention to the fact that the Pullman Co. has recently been required by anti-trust laws to divorce its manufacturing business from its operating business, and expressed the view that the same rule should be applied to the Bell System.

Patience is the best remedy for every trouble.

—Plaitus, Rudens.

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North Dakota Farmers

(Concluded from page 29)

But the real news is that these exchanges are in truth "farmer" lines, for the farmers built them.

There is not space here to give the full picture of the work at Leonard, Addison, Harwood, Lynchburg or Chaffee, all bordering on the rich markets and shipping facilities of Fargo and Moorhead. Many men were instrumental in the new service.

They are men such as Walt Opperman, who led a crew that put in five miles of telephone poles in one day at Chaffee. Mr. Opperman is a farmer who, like others in the project, gave his time and energy to make it a success. Men of the telephone company, like Alex Nelson, Casselton manager and executive-in-overalls, had to cope with wartime shortages and still devise means of providing the best service.

Nine-Mile-Corners, an automatic switchboard set up in the front yard of the Greuel farm, nine miles south of Casselton, is an example of telephone company "know how." To save on wire and poles, both hard-to-get items, a switchboard was set up on the farm. The line existing from Casselton to the Corners was utilized as a trunk line and to it were connected the newly constructed lines from Addison, Lynchburg, Leonard and Chaffee and other towns. In all, five new automatic switchboards, equipped to select and relay calls mechanically to any point in the Fargo-Moorhead area as well as neighboring points, were installed. Additional equipment for the Fargo exchange was manufactured to take care of the more than 500 new telephones in the rural areas.

The Northwestern Bell invested more than $100,000 into the combined projects to unify the towns of the valley into a common dial system before the Comstock exchange was cut in for actual use. The cost would have been far greater if it had not been for the aid of the farmers, not only in actual work but in organizing the community so that everyone who wanted a telephone spoke for it. Thus lines were routed economically and miles of wire and hundreds of poles were saved. Through the use of farmer labor and with the backing of a community desirous of metropolitan telephone service, this new system may be adapted to peacetime construction in other towns.

W. J. Brazell, North Dakota vice president and general manager of Northwestern Bell, has come closer to realization of one of his fondest dreams, a telephone for every farmer. But it was possible only with the cooperation of the farmer.

"It will be quite a while before the company realizes on its investment," Mr. Brazell said. "This is a long term investment, to be sure. *But the farmer and the land he works and lives on are long term things.*"

V V

Northern Ohio Company Elects Wm. C. Henry, President

At the recent annual meeting of stockholders of the Northern Ohio Telephone Co., Bellevue, Ohio, Wm. C. Henry, president of United States Independent Telephone Association, was elected president and general manager. Other officers elected were: Chairman of the board and general counsel, Allan G. Aigler, Bellevue; vice president, John E. Wise, Willard, Ohio, and secretary-treasurer, W. H. Todd, Bellevue.

Directors of the company elected were as follows: Mr. Aigler; Mr. Henry; Gustav Hirsch, Columbus, Ohio; Mr. Wise; Dudley A. White, Norwalk, Ohio; Robert T. Campbell, Galion, Ohio; F. W. Uhlman, Bowling Green, Ohio, and H. A. Erf, Cleveland.

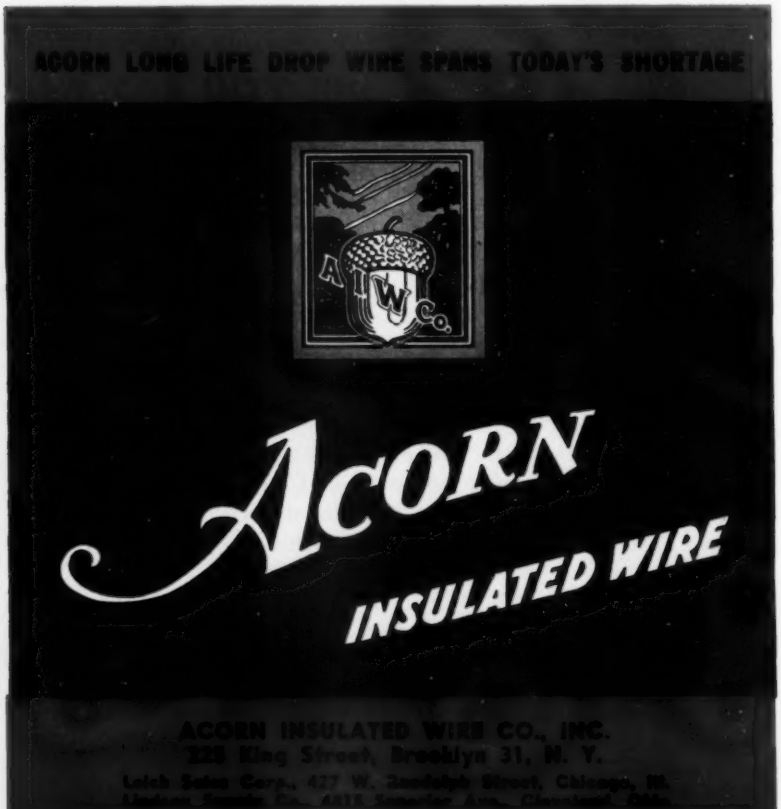
V V

Chinese Telephone Officials Study Independent Operations

Two Chinese telephone officials recently spent a few days in Fort Wayne, Ind., studying the methods of operation of the Home Telephone & Telegraph Co.

Making the study were Tsu-Mu Chang, a 1922 graduate of Chiao Tung University, who since 1942 has been technical assistant to the political vice-minister of the Chinese Ministry of Communications, and Tsen-Wei Wong, a graduate of the same university in 1925, who is chief of the personnel department directorate of general telephone communication for China.

The Chinese telephone officials have been in this country for about six months and have spent several months in Washington. They plan to return to China in July.



Veterans Want to Purchase, Lease or Operate Exchange

After giving careful consideration to their plans, three veterans possessing telephone experience and a desire to make the telephone industry their lifetime work have written TELEPHONY a letter which they hope will bring contact with the owner of an Independent company preferably in the state of New York or in some New England state.

These veterans are interested in buying, leasing, renting or operating an Independent exchange or exchanges and we are publishing the letter in the hope that it will reach someone who can provide the veterans with the opening they are seeking.

"Have noticed both in your magazine and the Camp Crowder post newspaper, notices for personnel in the telephone field. With that in mind, I thought perhaps you might be able to help me with a little problem.

"Several of us are desirous of buying, leasing, renting or operating for an owner an exchange in New York state or the New England states. . . .

"There are three of us with a combined knowledge of inside and outside plant both common battery and magneto.

"This is no idle fancy and careful consideration has been given the whole thing. . . ."

Very truly,
Lt. Edmund A. Seiz
Hqrs., 32nd Signal Trnq Bn,
Camp Crowder, Mo.

V V

Virginia Independent Plans Service Improvement Program

At the December meeting of the board of directors of Tidewater Telephone Co., Warsaw, Va., a program of improvement and expansion of the company's service was decided upon. Under this program every section served by the company will be benefited, according to a statement made by Rodney M. Coggin, president. The directors have authorized the expenditure of the sum of $300,000 for the completion of the program.

The Tidewater company bought on October 2, 1945, the telephone property formerly owned and operated by East Coast Telephones, Inc., in the counties of Richmond, Lancaster, Northumberland, Westmoreland, King George, Stafford, Caroline, Essex, Middlesex, Mathews, Gloucester, King and Queen, King William and Hanover. (TELEPHONY, August 18, page 27.)

Since acquisition of the property the management has been formulating plans for extensive improvements and modernization of existing lines and exchanges, the establishment of several additional automatic exchanges, the

STROMBERG-CARLSON RECOMMENDS...

"Eveready"
"Columbia"
"Gray Label"

The quality cell preferred by telephone engineers

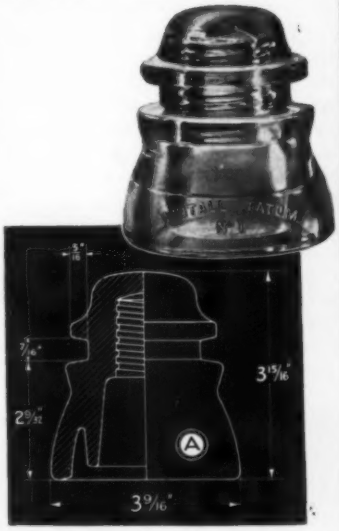
Long Life Telephone DRY CELLS

- Higher sustained voltage.
- Longer life.
- Rock-bottom economy.

These qualities, more important now than ever before, are assured through the constant supervision of America's largest dry battery laboratory.

Made by the makers of "Eveready" "Air Cell" Operators' Transmitter Batteries.

ARMSTRONG'S
"WHITALL TATUM"
GLASS INSULATORS



BECAUSE:

1. Batch materials undergo rigid chemical laboratory inspection.
2. They are precision-made entirely by automatic machinery, eliminating human errors.
3. Quality of glass is assured through microscopic examination.
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Characteristics of "Whitall Tatum" Glass Insulators:

- Accurate dimensions
- True pin fit
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They conform to—or exceed—A.S.T.M. standards.

STROMBERG-CARLSON COMPANY

Factory and General Offices: Rochester 3, New York, U.S.A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

building of additional toll facilities and the extension of lines into sections in the company's territory where service is not now available.

V V

Farm Telephone Is Necessity, Rural Survey Shows

The farm telephone is a real necessity, according to replies of 2,769 rural users, living near 45 exchanges in the nine states covered by the Southern Bell Telephone & Telegraph Co.

This was indicated by 78 per cent of those who filled out questionnaires in rural survey booklets issued by the company to 4,000 farm users to find out how farm families feel about their rural service, its costs and facilities.

Forty-two per cent of the replies listed the farm telephone as "absolutely necessary," while 36 per cent called it just plain necessary. Fifteen per cent of the remainder regarded it as a convenience, and only four persons listed it as a luxury.

"What to you is the most important reason for having a telephone?" brought the reply that 48 per cent of the rural users considered the answer business such as helping sell farm produce, ordering supplies from town and contacting others to help operate the farm. Forty-seven per cent found emergencies such as illness and fire constituted their reason for telephone use.

Listening in on the line was reported by 32 per cent of the replies, and only 12 per cent indicated they were bothered often by the amount of ringing on their line. Seventy-seven per cent thought that a signal consisting of a quiet buzz, put on the line for a second to notify those talking on local calls that their conversation had lasted five minutes, was a good plan.

The survey disclosed that the average rural family makes between 11 and 20 calls a week and receives about the same amount. Replies revealed that 35 per cent of the rural users make fewer than one long distance call a month, 22 per cent make about one call a month and 32 per cent, more than once a month or "often."

Eighty-two per cent of the respondents, consisting of persons for whom Southern Bell owns and operates telephone service as well as a representative number of farmers who own and maintain their own lines, said they thought it better for the telephone company to build and take care of the lines. Only 6 per cent thought it best for telephone users to maintain their own lines. Comments written in on the questionnaire mentioned the maintenance and up-keep factors as weighing heavily on the farmer-line owner-operators.

Most of the replies to the question, "What is the most important thing the telephone company could do in connection with its effort to improve and extend telephone service in rural areas?" were that more lines should be built in rural areas.

Of interest to the rural development survey was that 35 per cent of the respondents showed the opinions to be those of both husband and wife, revealing that family discussion and mutual interest in the rural telephone question had guided the replies.

V V

New York Bell Schedules Plant Construction Program

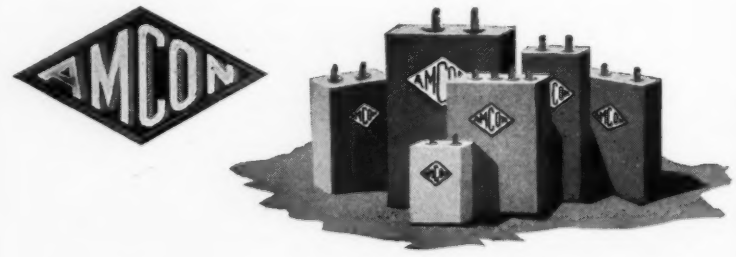
Plans for a plant construction program involving an estimated expenditure of $80,000,00 in 1946 and of $350,000,000 in the five years through 1950 were announced by the New York Telephone Co.

The program calls for plant expansion, replacements, betterments and service improvements throughout the company's territory in New York City and state and the adjacent section of Connecticut.

The cost of new station equipment and of replacements of old equipment with later types is estimated at some $172,000,000 for the five years. The central office equipment program through 1950 is figured at about $95,000,000. It includes, in addition to the facilities required for growth, the extension of dial service by replacing approximately 150 manual offices serving some 600,000 telephones. These replacements will include all remaining manual offices in New York City, most of those in Westchester County, and the larger manual centers in suburban Long Island and Upstate.

Construction costs for new cable, wire and poles are estimated at $55,000,000, including $40,000,000 for growth and improvements in connection with existing centers. Plans for new buildings and additions, alterations and improvements call for estimated expenditures of $12,000,000.

Among special new projects on the company's program are the following: Extension of dial service; installations for the introduction of operator toll dialing in the larger cities of the state; development of mobile radio-telephone service in New York City and vicinity, to bring the advantages of two-way voice communication to drivers of motor vehicles, such as doctors, ambu-



FOR DEPENDABLE RELIABLE SERVICE

AMERICAN TELEPHONE
AND
TELEGRAPH CONDENSERS

SPECIFICATION SHEETS ON REQUEST

AMERICAN CONDENSER CO.
4410 No. Ravenswood Ave., Chicago 40, Ill.

lances, buses, and service trucks; the company is taking part in building two new systems for multiplying the number of long distance channels for voice messages and for sound and television programs; work on the expansion and improvement of rural telephone service, interrupted by the war, and a war-interrupted program—the replacement of about 25,000 hand-crank telephones with modern type instruments.

V V

Retiring Independent Owner Thanks "Telephony" for Aid

With the sale of the Farmers Telephone Co., Milan, Mo., to the Milan (Mo.) Telephone Co., TELEPHONY acknowledges with regret the departure of the Farmers company's former owner, Mrs. Vennie G. Love, from the telephone industry of which she was long a member.

Mrs. Love had been president and manager of the company since the death of her husband, Penn Love, in 1937. The Loves formerly owned the Daviess County Telephone Co., Gallatin, Mo., before they purchased the controlling interest in the Farmers company in 1922.

In a letter to TELEPHONY announcing her plans, Mrs. Love paid tribute to the publication and its personnel as follows:

"When we purchased the Farmers Telephone Co. in Milan in 1922 and moved here, TELEPHONY came too. I have always felt that a telephone company couldn't function properly without TELEPHONY, and in the years since Mr. Love's death, it has been a guide and counsellor to me.

"Many of its personnel became familiar to me when I would meet them at our state and national conventions and was privileged to listen to their interesting and instructive talks. I never missed Mrs. Workman's page and I enjoyed meeting her personally.

"So it is with real regret that I say good-bye to my old friend TELEPHONY and wish all good things for the publication and for the people who make it the valuable magazine that it is."

V V

Lincoln T&T to Convert 47 More Exchanges to Dial

Officials and department supervisors of the Lincoln (Neb.) Telephone & Telegraph Co. met February 1 at headquarters to review the status and operations of the company and to discuss plans and objectives for developments during the remainder of the year. Forty-seven of the company's exchanges are to be converted to dial during 1946, in addition to the present 30 dial exchanges.

Discussion at the meeting also covered ways and means of extending rural service, interrupted by the outbreak of hostilities. It was brought out that about 80 per cent of the present farm homes in the company's territory, now without telephone service, could be provided with a telephone without special construction. Prosperous conditions on the farms, due to high prices and unusually large production, have made this a fruitful field as indicated by the large number of rural stations added since extension of service was made possible. More than a third of the company's employes in the armed services have returned, waiting lists rapidly are approaching their end in most exchanges and the volume of new equipment is steadily increasing.

John H. Agee, vice president and general manager, was in charge of the conference.

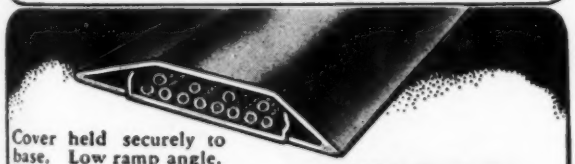
V V

OBITUARY

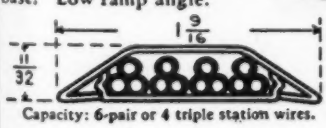
GEORGE W. BROWN, manager for 32 years of the Liberty Center (Ind.) Telephone Co., died recently in a hospital at Bluffton, Ind., following an illness of two months.

FOR OVER FLOOR TELEPHONE WIRING SYSTEMS

PANCAKE WIREMOLD

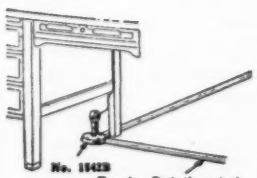


Cover held securely to base. Low ramp angle.



Capacity: 6-pair or 4 triple station wires.

No. 1500



Designed to meet telephone company requirements for extension wiring.

Send for Catalog and Wiring Guide No. 16 and Wiremold Engineering Data Sheets on Telephone installations.

THE WIREMOLD COMPANY, HARTFORD 10, CONN.

SUB-CYCLE

ASSURES COMPLETE SATISFACTION FOR THE RINGING SERVICE

ONE OF THE MANY reasons why Sub-Cycle is so popular as a Ringing Converter is because once put in service it requires absolutely no routine maintenance.

In Sub-Cycle there are no moving parts; nothing to adjust. It will not interfere with radio reception.

Here is a most dependable source of signaling that will go on delivering quiet, economical, efficient service for you day after day for a long period of time.

Sub-Cycle is built for heavy duty. It is made in 6 models for loads from small PBX to large central office. Output capacity 7½ watts to 40/50 watts.

•

ALSO PULSATORS

SOLD BY LEADING DISTRIBUTORS

LORAIN PRODUCTS CORPORATION
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PREMAX

Metal Pole Markers

Premax Stamped and Embossed Metal Pole Markers are again available for Public Utilities. These lifetime Pole Markers cut identification costs and save labor.

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We Make More
Different
Better
Reasonably Priced
TELEPHONE
DIRECTORIES
than any other printer

R. R. Donnelley & Sons
Company
350 E. 22nd St., Chicago

WITH THE MANUFACTURERS

Stromberg-Carlson Workers Near New Safety Record

Stromberg-Carlson Co., Rochester, N. Y., employes are nearing a mark of 2,000,000 man hours worked safely, highest in the company's history.

During a recent state-wide safety contest, the firm's workers compiled a record of more than 1,250,000 man hours worked without a lost-time accident.

Several excellent ideas from the workers themselves were credited with a share in setting the new record, George Schindler, safety inspector, disclosed.

V V

Automatic Electric Sales Corp. Names New Division Managers

H. F. Lello, vice president and general manager of Automatic Electric Sales Corp., has announced the following recent changes in the company's home office organization, to meet conditions growing out of reconversion to peacetime activities:

The east central division, consisting of the state of Ohio and parts of New York, Pennsylvania, Kentucky, Maryland and West Virginia, which during the war had been consolidated with the south central division, has now been re-established, with L. W. Carmichael as division manager. Mr. Carmichael, who was manager of the east central division before the war, has been relieved of special assignments in connection with wartime production and reconversion to re-assume his former duties.

W. B. Near, recently released from active service with the United States Navy, has been appointed division manager for the western division, superseding J. S. Douglas, who has been assigned to the Chicago sales office. Prior to entering the service, Mr. Near was a member of the government sales staff. A graduate of Annapolis, he was called to active service in 1942, and rose to the rank of lieutenant commander in the Naval Air Forces.

V V

Adds District Offices

For more adequate coverage of construction materials distributors and the electrical trade, General Electric Co., Bridgeport, Conn., has opened new district offices in Philadelphia, Pa., and Kansas City, Mo. Announcement of the organization's revision, which increases the number of company districts and managers to nine, was made by C. R. Pritchard, general sales manager of the application and merchandise department.

V V

A. B. Chance Co. Develops New "Tips Tugger" Hoist

The A. B. Chance Co., Centralia, Mo., has announced the development of a new "Tips Tugger" hoist for tightening guy wires, hoisting transformers and for a number of pulling, lifting and lowering jobs. These new tuggers will have a die cast aluminum body and handle for much lighter weight than any developed previously. The new model weighs only 13 lbs. but will lift a three-quarter ton load with a 60-lb. pull on the ratchet lever.

Another new feature is an operating trigger *(Fig. A)* that can be operated easily by the finger to change the action from "lift" to "lower." A turn button *(Fig. B)* releases the brake so that the chain can be moved freely to attach to the load. It is claimed the new tugger has close control of take up and consequently is very accurate in spotting loads. The chain is a high strength, Herc-Alloy link type which will not kink, bind or become disconnected. The tugger has oil impregnated, porous bronze bushings in all rotating points, insuring smooth operation, maximum efficiency and long life. No lubrication is necessary.

The manufacturer says this new tugger was especially designed for utility operation. It is light weight, making it more easily handled on poles, towers, substations, etc.

V V

Roy Augustine Returns To Duties with Kellogg

Roy Augustine has returned to his post as telephone switchboard division engineer for Kellogg Switchboard & Supply Co., Chicago, following a leave of absence for special government service.

Mr. Augustine was "borrowed" by the Foreign Economic Administration last August and sent to Europe as colonel of a special military mission.

During his service in Europe Mr. Augustine covered 22,000 miles in jeeps, command cars and airplanes. Most of his work was in Germany where he surveyed communications equipment. Some of the information he obtained was presented as technical evidence in the Weisbaden and Nuremburg trials.

V V

Neoprene Now Used As Drop Wire Covering

A telephone conversation may speed over miles of cable and through relays and switchboards, only to come to grief when it hits the drop wire. Because of its exposure to sunshine, rain, sleet, snow, rubbing tree branches and contact with buildings, the drop wire probably suffers more than any other link in the over-all telephone circuit.

However, drop wire is now being covered with tough neoprene, Du Pont's synthetic rubber, and tests indicate this type of protection will reduce "out of order" reports and maintenance costs. Neoprene-jacketed drop wire developed by the Whitney-Blake Co., New Haven, Conn., is being installed in a number of communities throughout the country, it is said. It has been given the name of "Teleprene."

The neoprene jacket is applied over the rubber insulation and is designed to protect the wire from damaging influences and it is light and flexible. Neoprene is highly resistant to abrasion, heat, sunshine, cold, acid fumes, moisture, and injury by mold and bacteria, it is said. Its compression strength makes it less likely to crush where it is gripped by clamps. Another feature of the "Teleprene" wire is the unusually good adhesion between the wire itself and the rubber insulation. This is achieved by an electroplating method known as "Teleplate," the manufacturer reports.

Neoprene jacketed wires are being produced in several types. There is a parallel wire construction in which two wires are encased by a neoprene coating as a single unit, and the twisted pair arrangement of two separate wires. Each of these types is offered with or without fabric reinforcement under the neoprene cover.

V V

Johnson Rejoins Sylvania

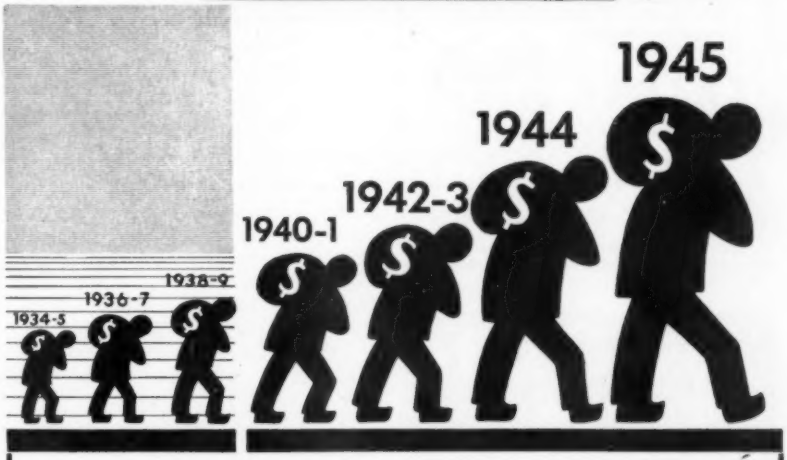
Lieut. Henry C. L. Johnson has returned to Sylvania Electric Products Inc., New York, N. Y., after three years of service in the United States Navy. He will resume his position as advertising manager of the radio division, and in addition will direct the advertising and sales promotion of the industrial electronics and international divisions.

V V

Mine Safety Appliances Co. Issues New Catalog

The new, complete 178-page 6-B catalog just has been published by Mine Safety Appliances Co., Pittsburgh, Pa., describing and illustrating the complete range of MSA safety

It's a Man-Sized Job



*Comparison of Advertising Revenues from Tri-County Tel. Co. (Michigan) Directories

TAKING full advantage of the wide opportunities for sale of Telephone Directory advertising is a man-sized job, requiring a clear understanding of the broad opportunities for increased revenue.

Note above how profits began to take man-sized strides when the Loomis Advertising Company took over advertising sales at the beginning of 1940.

We shall be glad to discuss with you the Loomis plan for increased revenue from telephone directory advertising. Roland T. Beard, Vice-president, Gettle Bldg., Fort Wayne, Indiana, and Wesley H. Loomis, Jr., President, personally invite your inquiry.

Loomis ADVERTISING COMPANY

502 Gettle Bldg., Ft. Wayne 2, Ind.

506 Olive St., St. Louis 1, Mo. • 20 West 9th St. Bldg., Kansas City 6, Mo.
Omaha Nat'l Bank Bldg., Omaha 2, Nebr. • 6908 Market St., Upper Darby (Phila.) Pa.

★Loomis Advertising Company took over directory sales at beginning of 1940. From actual case in Loomis files. Full details on request.

THE LINE IS BUSY!

We mean the Production Line at our Plant where every effort is being made to supply the demand for this masterpiece of seating comfort.

MODEL 2451

The operator's choice. One of two models. Adjustable in height. Rolled steel construction. Comfort speeds communication.

CRAMER Posture

CHAIR COMPANY

1205 CHARLOTTE STREET • KANSAS CITY 6, MO.

Test-O-Lite

TESTS ANY VOLTAGE . . .
100 to 550 Volts, A.C. or D.C.
Safely, Swiftly, Surely

THE NEON GLOW
LOCATES TROUBLE INSTANTLY

Indicates hot or grounded wires. Tells AC from DC. Far superior to ordinary clumsy test bulb. Indispensable in shop or home. The only pocket-size tester with PATENTED SAFETY FEATURE.

Life-time guarantee. List $1.50. Purchase thru electrical dealers. Pat. No. 1,778,883.

RTC-2 VINCENT RARE GAS RELAY

for harmonic or coded bells. Dual purpose device which economically improves both ringing and transmission on party lines. NO MOVING PARTS. Fully guaranteed. Can be installed in a minute.

L. S. BRACH Mfg. Corp.
200 Central Ave. Newark, N. J.

equipment for industrial application, including many new products.

A six-page introductory section illustrates and describes the complete research laboratories and plant facilities of Mine Safety Appliances Co., the world's largest commercial manufacturer of approved safety equipment.

The regular edition of the 6-B catalog is in its usual 8½ in. x 11 in. size. Also available is a new pocket-size edition of this catalog, 5 in. x 6½ in., containing the same material and number of pages as the large edition, but in the miniature size.

Copies may be secured by writing the company.

V V

Urges Exemption of Capital Goods from Price Control

Equipment distributors were urged to ask their congressmen to pass legislation exempting capital goods from price control by F. N. Bard, owner of the Barco Manufacturing Co., Chicago, Ill., in an address delivered to a group of Barco distributors during the recent convention of the Associated Equipment Distributors in Chicago.

Mr. Bard, whose company manufactures railway and aviation supplies, said the purchasers of capital goods have purchasing agents, statistics and facts upon which to make their purchases and they have to make a profit on their operation. Therefore, they are able to take care of themselves and do not need any control.

"If legislation were passed exempting capital goods from price control, consumer goods could get moving faster," he said.

Judges Selected for Wiremold Contest

The Wiremold Co., Hartford, Conn., has been successful in securing four men well known in the electrical industry to act as judges of material submitted in their "How-To-Use-It Contest." They are Laurence W. Davis, general manager, National Electrical Contractors Association; S. J. O'Brien, president, Electrical & Gas Association of New York; O. Fred Rost, editor and publisher, *Wholesaler's Salesman*, and Victor H. Tousley, electrical field engineer, National Fire Protective Association.

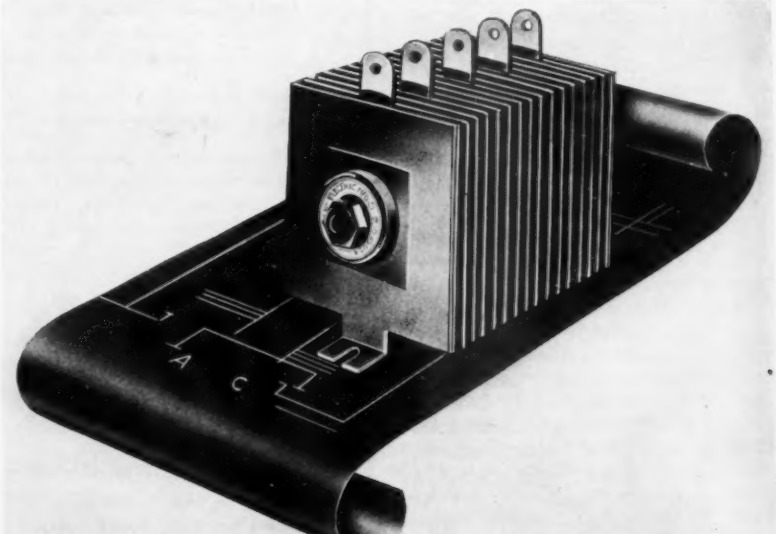
The contest, which closes March 31, is open to all electrical contractors and maintenance men and calls for layout data, photographs, sketches, and detailed description of any wiremold installation, large or small, in any type of building.

Awards will be made for those installations judged as showing business-building possibilities in a wide field, as well as good judgment in the selection and use of Wiremold products.

V V

Benwood-Linze Announces Copper Sulphide Rectifier

The Benwood-Linze Co., St. Louis, Mo., has announced the development of a dry disc metallic rectifier which it is claimed does not require forced cooling. This rectifier is rated 50 amperes for 6-volt automotive battery taper charging. Two rectifiers may be operated in parallel from separate transformer secondaries to provide 100 amperes maximum charging rate without a fan.



Newly developed dry disc metallic rectifier.

Battery chargers of this type (designed to charge 6 volt batteries) operate from the usual 110 volt AC power supply, to deliver the required rating of DC to the battery.

This new rectifier, the manufacturer claims, makes possible, for the first time, the design of fast battery chargers rated 50 amperes without any moving parts.

V V

Kellogg Opens Texas Office For Sale of Surplus Material

Kellogg Switchboard & Supply Co., Chicago, acting as general agent for the Reconstruction Finance Corporation, has opened a special branch office in San Antonio, Tex., to facilitate the sale of surplus communications material for the government.

More than $1,250,000 worth of communications equipment has been turned over to the Kellogg surplus material division for disposal. According to J. M. Nolan, manager of the division, there is a brisk demand for this type of equipment.

V V

Telephone Secretary Service Feature of Western Electric

"Telephone secretarial service" and selective ringing were features of the mobile-telephone system exhibited by Western Electric Co., New York City, at the IRE convention held January 23 through January 26 at the Hotel Astor. This new FM development, designed by the Bell Telephone Laboratories for installation in vehicles operating in urban areas, will make immediate contact with any telephone reached by the Bell System.

Compact and lightweight, the equipment comprises a radio transmitter, radio receiver, control unit, antenna and cable. The control unit containing a hand telephone of standard design is mounted under the dashboard and the antenna is mounted on top of the automobile. The remainder of the equipment need not be visible in its mounting.

The equipment is designed to withstand the rigors of service in a moving vehicle with a minimum of maintenance. Transmission performance is comparable to other Bell System service.

The radio receiver, of the superheterodyne type, is highly sensitive and quartz crystal controlled. The radio transmitter, also quartz crystal controlled, is frequency modulated and has an output power of at least 15 watts. Operating power for the mobile telephone is derived from a heavy duty six or 12-volt car battery with oversize

TRUCKS and TOOLS

for line construction and maintenance

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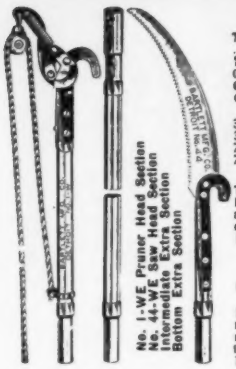

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Length	Weight
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30 in. Saw	1½ lbs.
72 in. Section	2 lbs.
72 in. Section	1¾ lbs.
Total Weight	8 lbs

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